

EOI INTENTRENDS

WESTERN EUROPE

1989 - 1994

INPUT

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WESTERN EUROPE 89-94

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The ERIC logo, consisting of the word "ERIC" in a stylized font with a circular graphic element.

CAT. No. 23-108

PRINTED IN U. S. A.

INPUT®

Researched by
INPUT
Piccadilly House
33/37 Regent Street,
London SW1Y 4NF
England

Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

**Electronic Data Interchange Programme—
Europe (EDIP)**

EDI Intertrends—Western Europe, 1989-1994

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Abstract

Electronic Data Interchange (EDI) is the electronic transfer of business transaction information between applications in a structured format conforming to a standard. The trading partners invariably have different processors and data formats, thereby creating the need for translation between common formats and standards.

EDI is emerging as an area of increased focus, and this report examines the development of this strategically important and fast-growing market opportunity in Western Europe. The report provides an assessment of the current size of the market, the strategies employed by the leading network services vendors, EDI software market directions and the growing role of professional services organisations. The market is analysed by individual country with forecasts through to 1994, including an assessment of the major development forces that are driving market growth. The report also includes survey-based findings on EDI user managers' concerns regarding standards, integration, vendor viability and the importance of EDI in the development of a "single European market".

This report contains 160 pages, including 79 exhibits.



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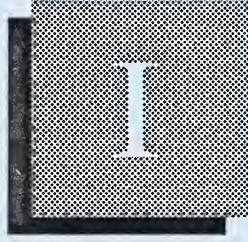
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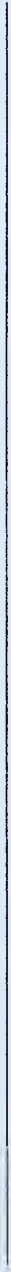
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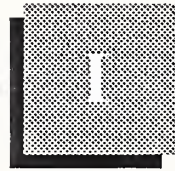
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Introduction





Introduction

This report, produced as part of INPUT's Electronic Data Interchange Programme, examines the Western European EDI market, providing a comprehensive investigation and analysis of European developments in this rapidly developing market.

A

Scope of the Report

INPUT defines EDI as the intercompany electronic transfer of business information between applications in a structured format conforming to a public or de facto standard. The information represents standard business documents, such as invoices, purchase orders and logistical information.

This report focuses on third-party EDI service and software markets in Western Europe and excludes consumer applications such as electronic shopping, electronic banking, automatic teller networks (ATMs), point of sale (POS) terminals, airline reservation systems, credit authorisation systems and other "captive" networks that are used for transactions between two parties. Whilst these systems do use electronic "forms" to transfer information, the applications generally use specialised terminal devices to communicate with dedicated computers and are not computer-to-computer, application-to-application implementations and use proprietary data formats rather than public standards.

EDI involves the transmission of data in one of several standard formats, with EDIFACT (Electronic Data Interchange For Administration, Commerce and Trade) emerging as the most likely "international" standard. In most instances, data from installed applications are translated to the standard prior to transmission, otherwise a third-party service will carry out on-network translation. It is usually necessary for the data to be translated again into formats recognised by a trading partner's computer applications. The value of EDIFACT in Western Europe will be considerable: the widespread use of EDIFACT will enable communication across industry lines and will create a market for additional interchange applications.

The majority of users are still at an early stage with EDI. However, some organisations are already adding transactions to those they handle electronically, whilst a few are looking to integrate EDI functionality with internal applications. The benefits of EDI, when integrated into an organisation's overall business philosophy, are vast. At this early stage in its development in Western Europe, it is changing the way companies are doing business, with the consequent improvements in an organisation's overall efficiency.

EDI can be configured either point-to-point, directly between trading partners; on private networks; or through third parties—network services vendors. These firms serve as collection and switching services that perform store-and-forward tasks and other processing (i.e. reports, audit trails etc.) In addition to these firms, EDI is providing new lines of business for software vendors and professional service companies as well as helping form pan-European trade and industry associations in many vertical industries. With so many players, the European EDI market is a very competitive environment, and telecommunications deregulation across Europe is helping to maintain this.

Users will ultimately benefit from industry competition through a variety of choices, competitive pricing and improved features. Profitability for vendors however, remains elusive and is likely to remain so for some time.

This report is designed to assist vendors in:

- Identifying new markets and product opportunities
- Assessing product and marketing risk exposure
- Allocating research, development, and operational resources
- Offering insights into market developments

The report describes and reviews the state of the EDI software and services market in Western Europe in 1989 and presents a forecast through 1994.

The report discusses the key needs and strategic issues for EDI network services, software and professional services vendors in the markets of France, the United Kingdom, West Germany, Italy, Benelux, Scandinavia and the rest of Europe.

B

Methodology

The research for this report consisted of:

- Structured interviews with senior personnel in both the information services and end-user departments of a wide cross-section of companies.

- In-depth vendor interviews, the majority being face-to-face discussions were conducted with 35 representatives of Network Service and software vendors.

The questionnaire used is included in Appendix C.

- Interviews with other industry bodies, such as representatives of industry associations, PTTS (Post, Telephone and Telegraph companies) and common interest groups.

INPUT collected and analysed information on EDI software and services and reviewed secondary research sources.

C

Report Structure

This report is structured as follows and addresses the following topics:

Chapter II is an Executive Overview of the entire study.

Chapter III is an EDI Overview, describing the different types of EDI and the role of the key players in the different European countries.

Chapter IV contains market analysis, forecasts and opportunities.

Chapter V is a review of the development forces, issues, and competitive environment in the West European country markets.

Chapter VI reviews the User Environment—survey-based findings on the issues and concerns of European users, regarding standards, integration, vendor viability and 1992.

Recommendations for users and vendors are found in Chapter VII.

Definitions of EDI-related terms can be found in Appendix A. Vendor and user questionnaires are in Appendices B and C.

Appendix D provides an analysis of the research sample. Appendix E provides detailed year-by-year forecast figures, in local revenues, from which the exhibits in the report are derived and a reconciliation of INPUT's previous and current assessments of the EDI market.

D

Related INPUT Reports

This report is one of many focused on EDI; other reports include:

EDI Intertrends—North America

EDI Software Product Provider Profiles

North American EDI Service Market Analysis, 1988-1993

North American Service Provider Profiles

Vertical Industry EDI Directions and Potentials

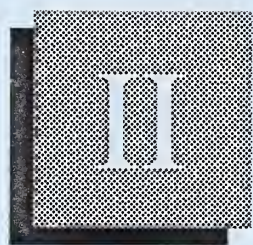
EDI in Professional Services

Network Services in Western Europe, 1988-1993

X.400 and EDI

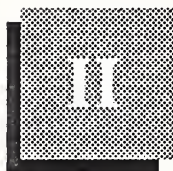
International EDI Services

Federal Government EDI Initiatives



Executive Overview





Executive Overview

A

EDI Usage is Expanding Rapidly

Electronic Data Interchange (EDI) is the electronic transfer of structured business data between computer applications in different organisations. It is process-to-process communication in machine-readable formats and overcomes organisational differences in computers, protocols and data formats.

The implications of EDI for business are fundamental: in some sectors, where EDI is well established, it is a prerequisite for doing business. In retailing and automotive manufacture for example, some large organisations already insist that their suppliers and distributors make use of EDI.

EDI can lead to substantial increases in market share, especially where customer service, rather than price or product design, is the key differentiator. A significant reduction in time between placing an order and receiving the goods can provide an immediate competitive advantage.

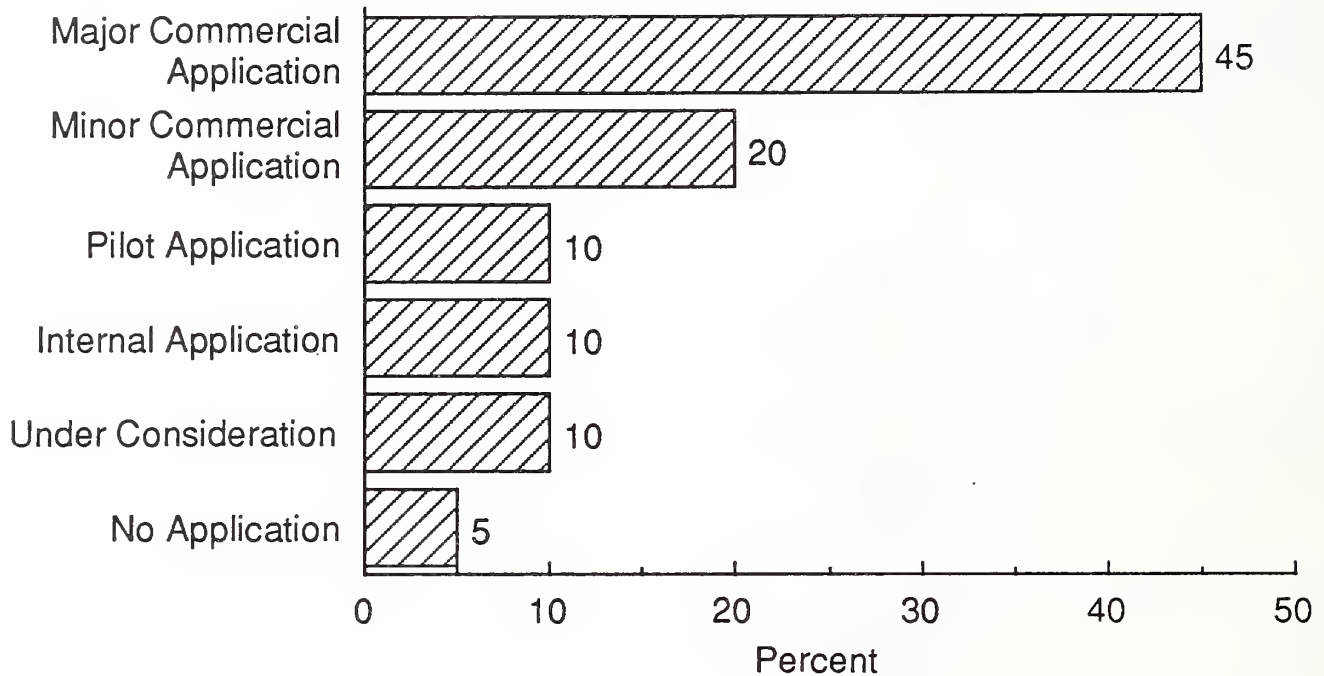
As Exhibit II-1 shows, INPUT's user survey found that 65% of respondents were using EDI for commercial applications, with a further 30% either running pilot or internal applications, or actively considering EDI.

Users expect their transaction volumes to increase by over 100% between 1989 and 1990, as a result of adopting additional transaction types. All this points to a rapidly expanding market.

Whilst the initial reasons for introducing EDI were to reduce costs and errors (no need for rekeying data) and to save time (faster responses due to nearly instantaneous electronic communication), it is clear that EDI has far more fundamental implications.

In some sectors, EDI has become a prerequisite for doing business and in others, EDI usage has resulted in dramatic changes in market share and competitiveness of supplier organisations, as well as affecting the very nature of trading relationships between suppliers and customers.

EXHIBIT II-1

EDI USAGE IN WESTERN EUROPE

Source: INPUT User Survey (100 companies)

In essence, EDI is not just another application of technology. It is a way of doing business, with fundamental implications for organisations in all spheres of activity. INPUT believes that EDI will become a permanent feature of the business environment throughout the developed world. Whilst some of the bureaucratic structures in Europe have delayed its full introduction, the sheer commercial pressure for EDI services is such that these governments and PTTS have not been able to stand in the way of EDI developments.

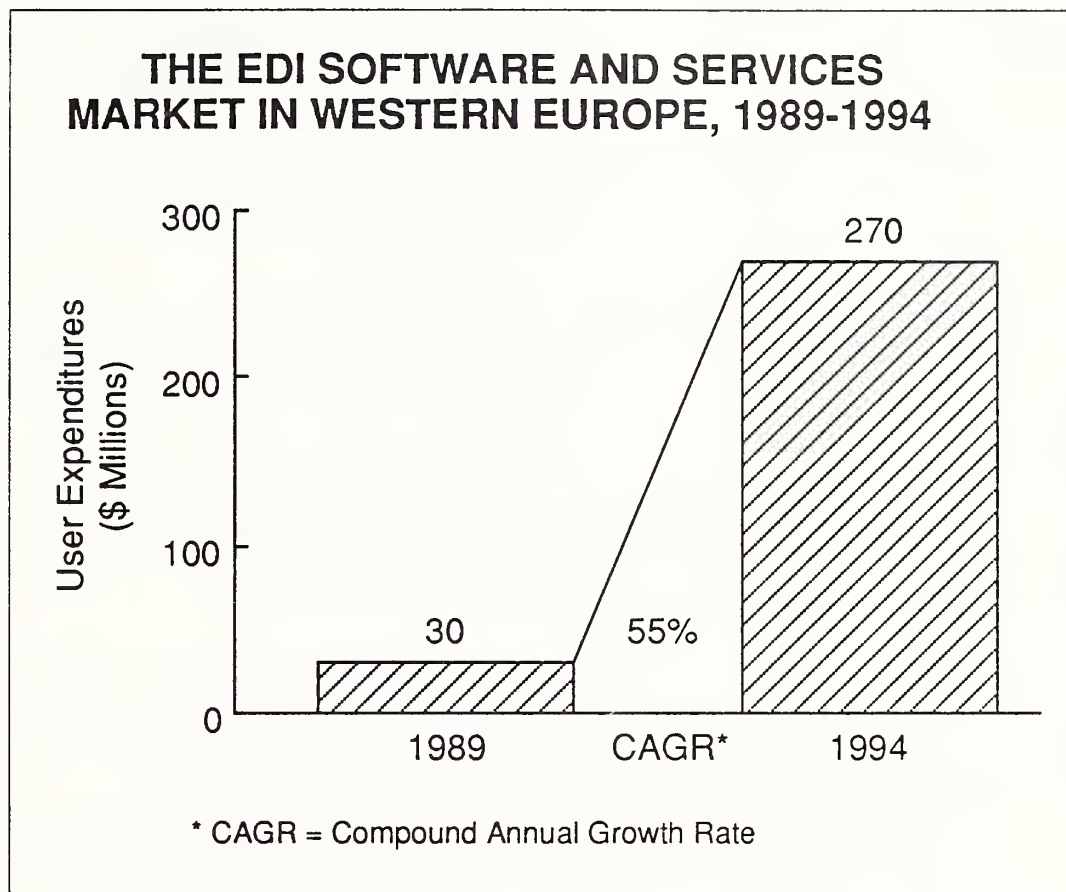
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**Western European
EDI—A \$270
Million Market by
1994**

The 1989 EDI software and services market is anticipated to reach \$30 million and to grow at a compound annual growth rate of 55% to become a \$270 million market by 1994, as shown in Exhibit II-2. The forecast includes third-party EDI service and software markets and excludes consumer applications such as electronic shopping, electronic banking, automatic teller networks (ATMs), point of sale (POS) terminals, airline reservation systems, credit authorisation systems and other “captive” networks that are used for transactions between two parties. Whilst these systems do use electronic “forms” to transfer information, the applications generally use specialised terminal devices to communicate with dedicated computers and are not computer-to-computer, application-to-

application implementations, and use proprietary data formats rather than public standards.

EXHIBIT II-2



Whilst EDI development in the U.K. is ahead of the rest of Europe, the opening of private, internal EDI networks and the realisation of the large number of pilot projects in Western Europe will result in the major economies, such as France and West Germany, showing a higher rate of growth during the forecast period than the U.K.

EDI is developing within and across industry sectors. However, only a small number of organisations have fully integrated EDI into their business philosophies and external operations. This remains one of the key challenges for European organisations using EDI and its competitive advantages in the run up to the single European market.

The proportion of business transactions being carried out by EDI is growing rapidly as the larger, innovative users (the "hubs") move towards volume implementation covering a growing number of documents and messages in the trading cycle. This growth will be stimulated by the "hub and spoke" approach, whereby the smaller trading partners are persuaded to use EDI, European deregulation of international trade and the corporate requirements to streamline information flow.

C

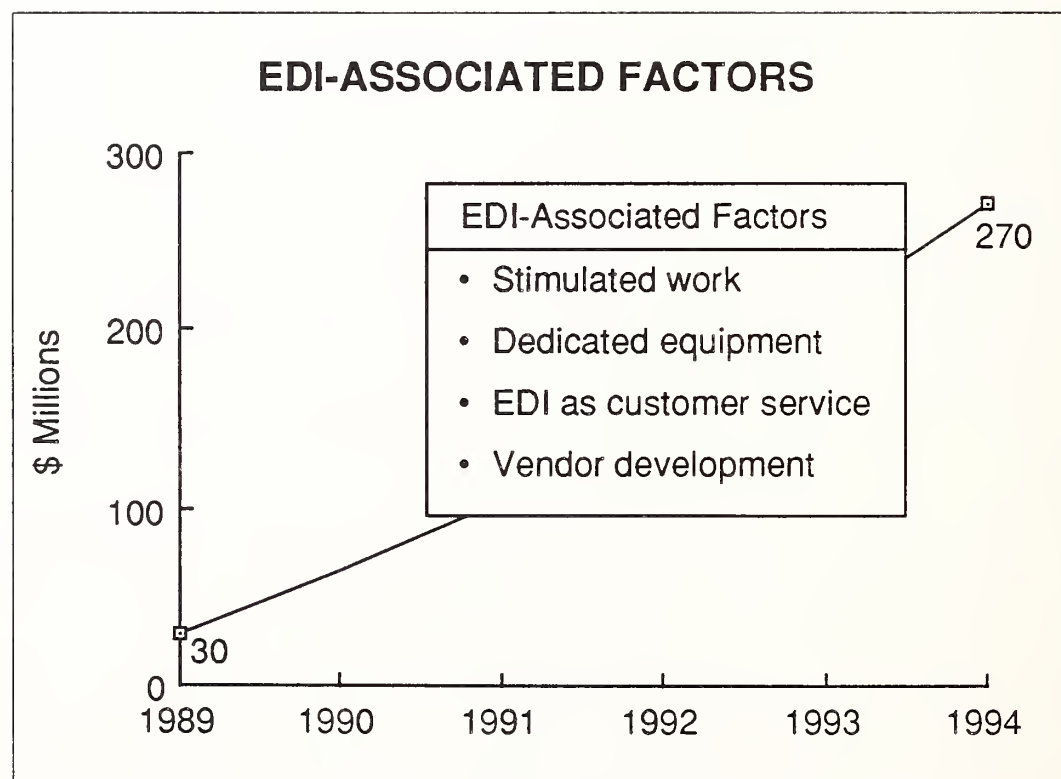
EDI-Associated Factors

In addition to the market identified by INPUT, there exists a substantial number of EDI-associated factors which include:

- Users have reported considerable internal expenses to upgrade systems to support EDI; EDI-associated development work, aligned with EDI, will surpass EDI-specific expenses considerably.
- Computer and communications equipment, currently excluded from the market sizing, may be dedicated to EDI or share EDI functionality with related applications.
- Many companies, particularly in the transportation sector, offer EDI as a customer service. These systems, developed internally or by professional services firms, are not included in the market sizing.
- Network services firms and software companies often contract for their EDI product development. Such vendor-vendor contracts, for professional services or commercial systems integration, are not in the market sizing.

Accordingly, the total EDI market will probably exceed the projections made in the forecast. These EDI-announced factors can be seen in Exhibit II-3.

EXHIBIT II-3



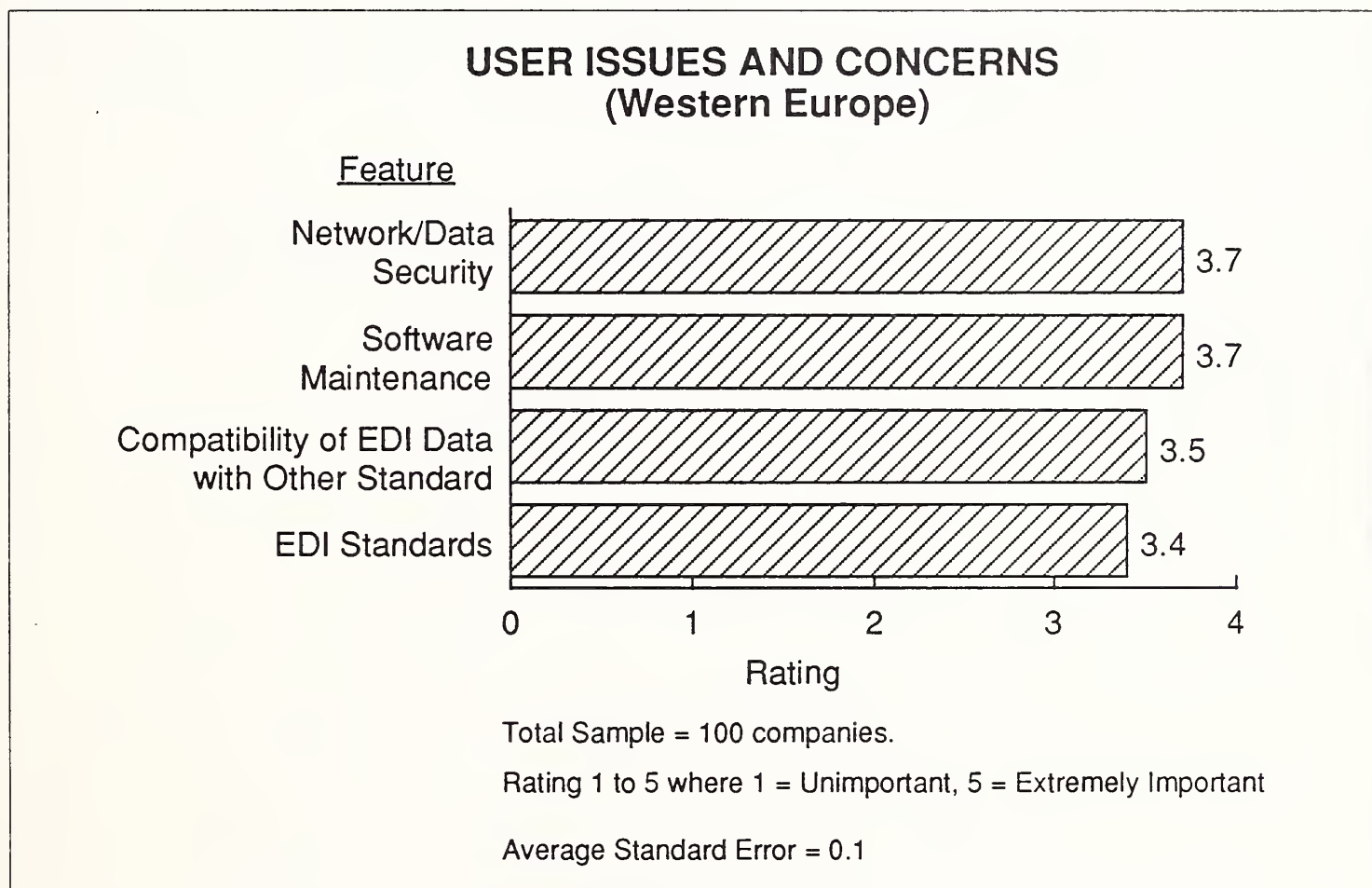
D**User Issues**

Users interviewed by INPUT reported that network/data security was their most important concern relative to EDI. This indicates that EDI is at an early stage of development and that the majority of companies are using third parties. The larger companies with sizeable individual transactions have most to lose.

It should be noted that vendors themselves are taking the security issue seriously—they are keen to avoid any breakdown in trust between themselves and their customers.

The other major concerns were software maintenance, compatibility of EDI data with other applications and standards, as shown in Exhibit II-4. These three factors are all interrelated.

EXHIBIT II-4



INPUT believes that once users fully understand the relationship between existing and developing standards, their concerns will diminish. The problem with EDIFACT and international standards is that the issue appears to be unsettled, thus confusing users as to which software and applications to develop.

INPUT believes that cross-industry standards, such as TRADACOMS, will encourage cross-industry trading as well as relaxing users' concerns. National or industry standards can be developed and implemented more quickly since the user community is more closely knit and shares communality of interest.

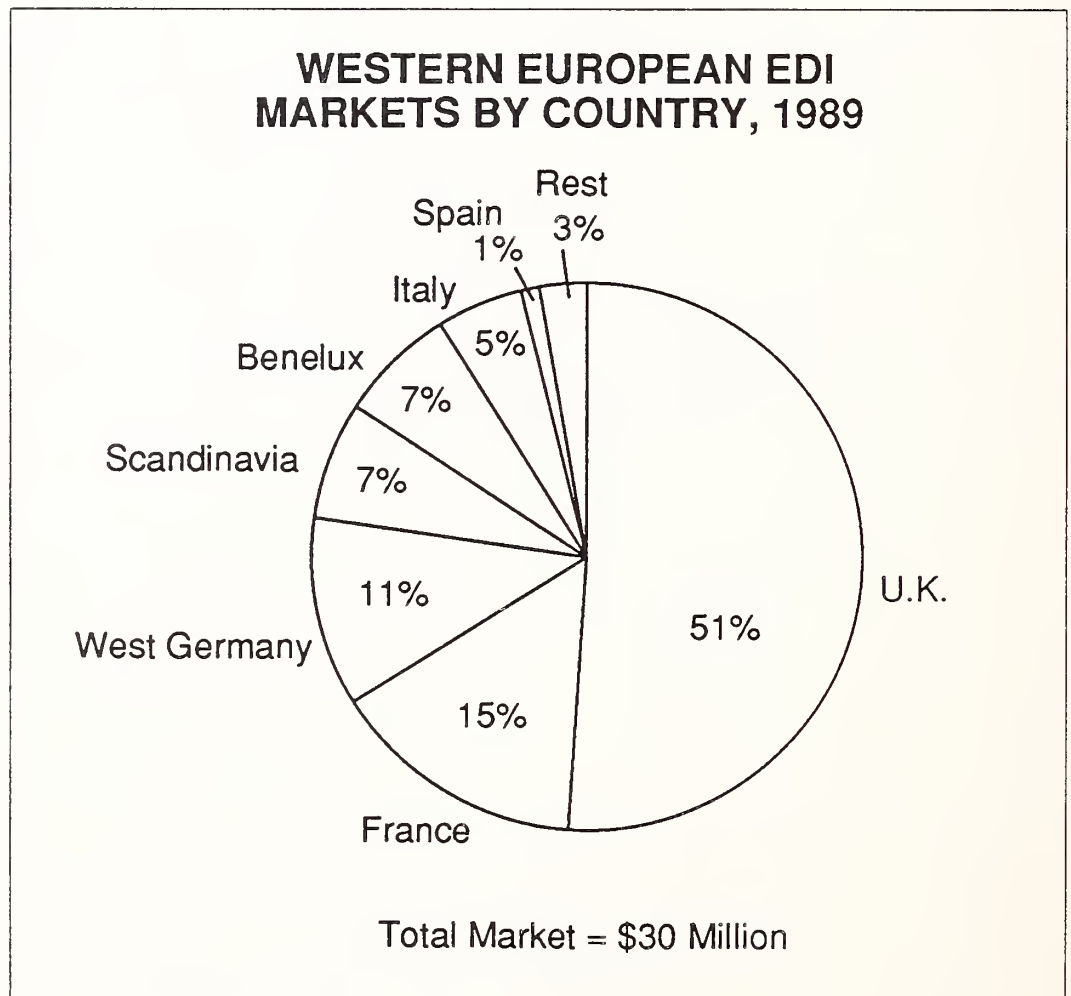
The concern about compatibility with other applications stems from users focussing on internal structures. Once EDI is fully integrated into a company's business philosophy, this concern will cease to be a problem.

E

Principal Country Markets

Exhibit II-5 shows the country market analysis of the EDI software and services market in Western Europe in 1989. Fifty-one percent of the market is currently accounted for in the U.K., where the market benefited from the liberalisation of service provision in the early 1980s by privatising British Telecom and introducing competition in the form of Mercury. A host of other players, IBM, GEIS and EDS were attracted by the rewritten rules and the promise of profitable investment as traffic could be diverted from the national networks onto their own systems.

EXHIBIT II-5



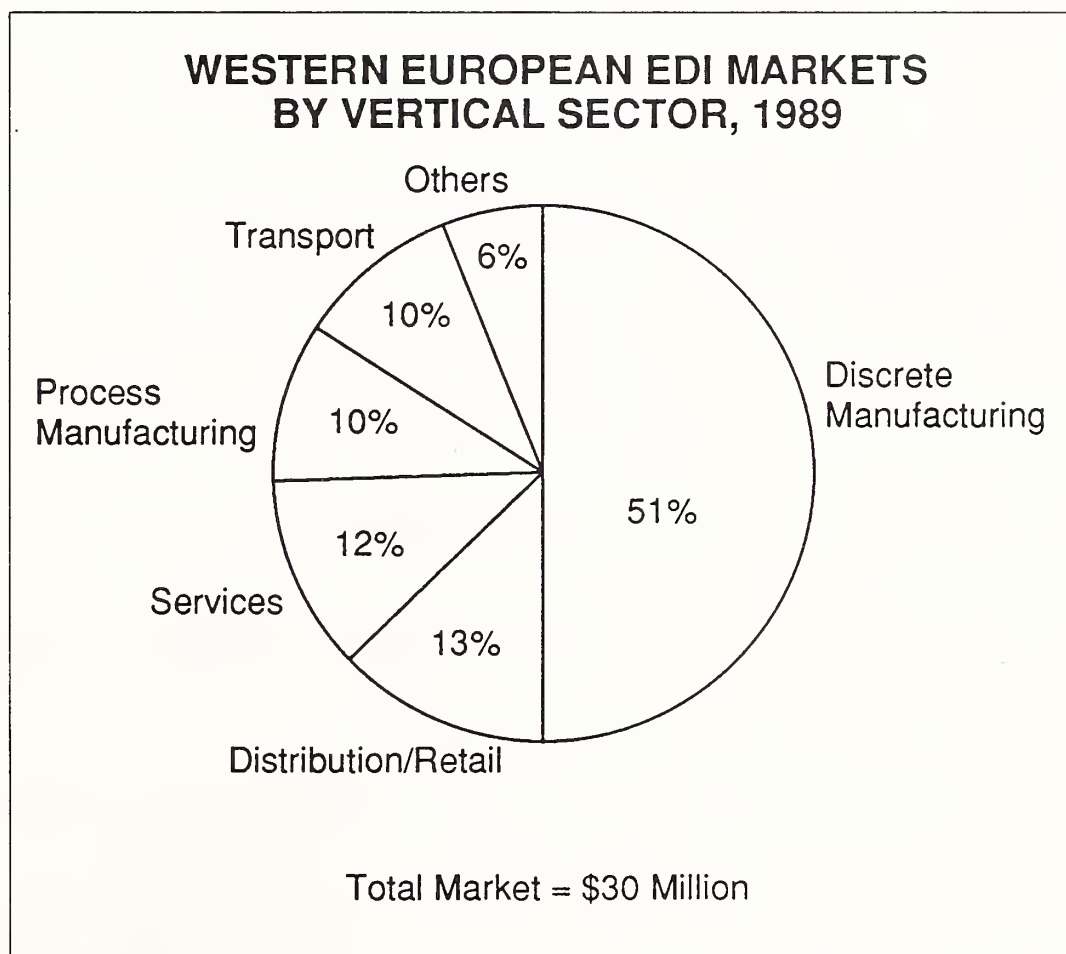
The stages of development of EDI varies markedly from one country to another. Whilst the key factor underlying these differences between countries is the extent of deregulation of the telecommunications market, the differences also illustrate the strong national delineations regarding EDI—in mainland Europe most of the EDI communications have been done via-direct links between trading partners rather than the clearing-house approach adopted by the U.K.

F

Principal Industry Sector Markets

Exhibit II-6 shows the principal vertical sectors that constitute the EDI software and services market in Western Europe. The manufacturing sector is by far the largest, accounting for over half the total market, reflecting the perceived benefits of EDI in enabling just-in-time manufacturing techniques and the consequent improvements in inventory levels.

EXHIBIT II-6



The retail and distribution sectors and the services sector (19%) are also key markets for EDI, reflecting the reach of the large multinational third-party networks and the drive towards improving pan-European communications. This is evidenced by the number of projects being carried out in the areas of transport, customs and distribution throughout Europe.

INPUT anticipates that the banking and financial sectors will show high rates of growth over the forecast period.

G**EDI Software and
Services:
Recommendations**

Organisations throughout Western Europe are becoming more aware of EDI and are coming to recognise—via vendor presentations, government initiatives and user implementation experiences—the complexity inherent in the decision to adopt EDI. The complexity often means that it is necessary to enhance or replace existing systems, or install new applications, in order to fully take advantage of EDI's speed and other improvements.

As a result, there are additional opportunities for vendors to increase sales and to develop professional services contracts. It is particularly vital at this stage for vendors to offer professional services in order to help with the integration of EDI and other applications and to overcome the inhibiting factor of an organisation's internal politics; optimally EDI should be implemented in several functional areas and to be incorporated into the overall strategy of an organisation.

As a result, it is vital that vendors either develop these skills themselves or form alliances that bring these capabilities to bear on the market. The emphasis should be towards offering a totally integrated EDI solution.

Furthermore, the EDI software companies should be looking to ease the integration of EDI with other applications and plan for integrated products that can be used throughout an organisation. These products may encompass a variety of related applications, such as electronic funds transfer, electronic forms processing and EDI-generated databases, in order to render the value of EDI throughout the organisation and trading group.

Recommendations are summarised in Exhibit II-7.

EXHIBIT II-7**EDI SOFTWARE AND SERVICES
VENDOR RECOMMENDATIONS**

- Integrate with related applications
- Offer professional services solution
- Overcome internal politics
- Address multiple functional areas
- Integrate with EFT
- Develop EDI databases

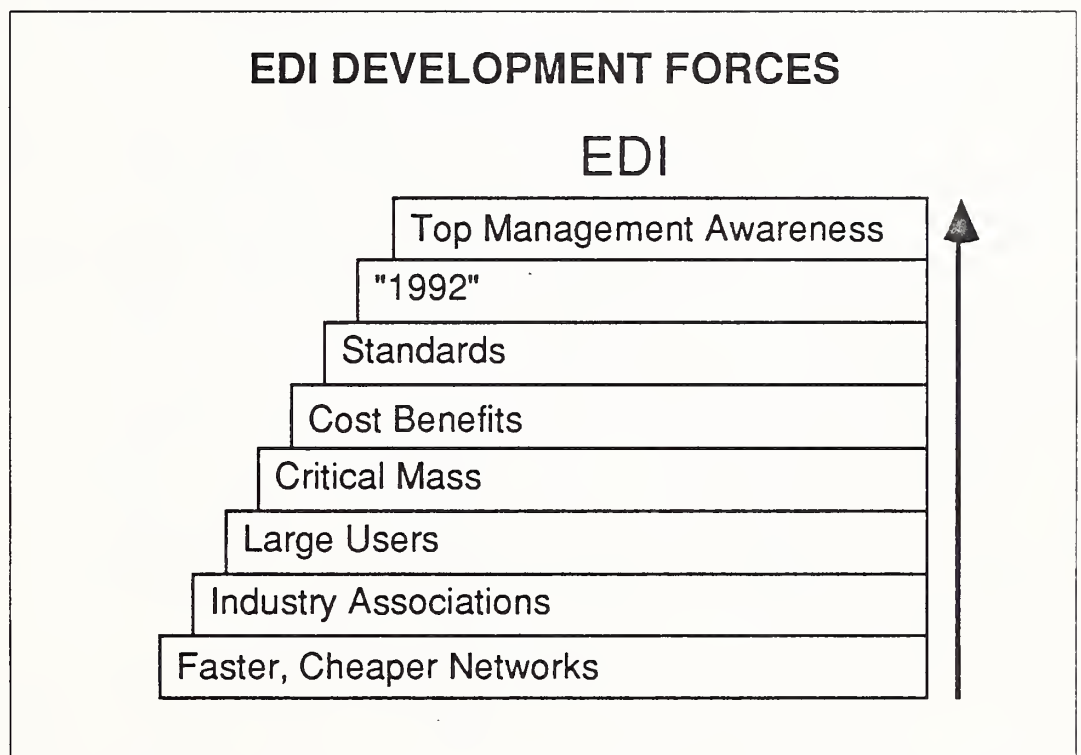
H

EDI Development Forces

Exhibit II-8 shows the development forces behind EDI's growth; the existence of faster, cheaper networks is a key development force because of three chief factors:

- Deregulation of the public telecommunications network
- Blurring and lack of technological distinction between data processing, office automation, telecommunications and control systems technology through the common use of network-oriented microprocessor-based systems
- The growing dependence and commitment to the network and the network "backbone" as a framework for conducting business

EXHIBIT II-8



For the financial and operating benefits of EDI to be realised, a critical mass of trading partners is crucial, for it is only when this stage is reached that the paper-based operations can be reduced. INPUT's user research has indicated that some larger organisations have addressed this requirement (for critical mass) by forcing suppliers to adopt EDI; the user organisation may be inadequately prepared to adopt the changed business practices required for EDI integration.

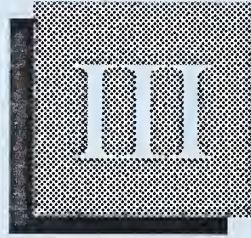
INPUT believes that multiple standards will not represent a significant impediment to international EDI. Standards supporting international trade are increasingly available, and the work of the UNECE is proceeding fairly rapidly. Furthermore X.400 will work to overcome incompatible systems and support internetwork communications.

Early adopters of EDI that have reaped the early rewards of cost reduction are now creating new trading structures, which will result in significant cost benefits.

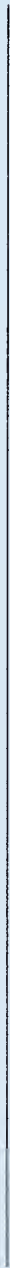
The existence of industry associations—which usually comprise competitors—means that organisations are working together to define the messages required, using whatever syntax and message standards are available internationally; this will be carried out by development groups, mirroring the different sectors of the industry and will continue to stimulate EDI growth.

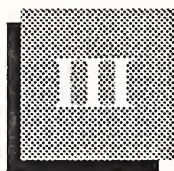
EDI technology is not a solution in itself. It is vital for top management to advocate and administer organisational change. This change comprises changes to business and working practices, job functions, manning levels, organisational infrastructures and the information flows.

INPUT believes that where office automation failed to fulfill the hype surrounding its introduction and failed to achieve a significant impact on an organisation's infrastructure, EDI—because it imports external influences and more crucially, because it cuts across internal functions and departments—is likely to meet much greater success.



EDI Overview





EDI Overview

A

Background

This chapter provides background information on the European development of EDI, describes the various strains of EDI and discusses the different EDI services and software as well as examining the important relationship between EDI and related applications. Finally, the development and important future role standards will play in a healthy European market is discussed.

B

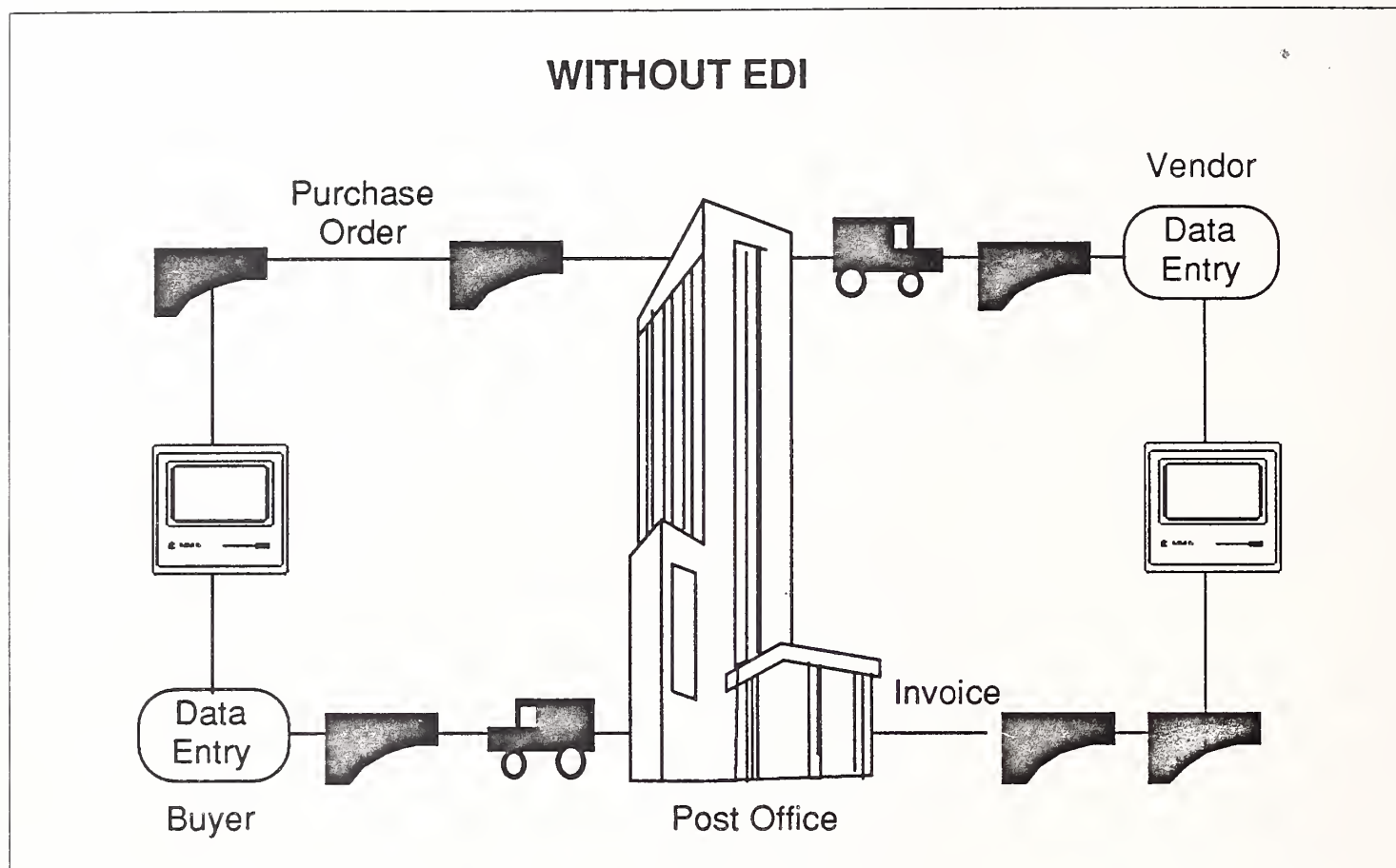
Before EDI

Most European organisations have installed computer systems to support routine business operations and computer applications to prepare business documents such as purchase orders, invoices, shipping instructions and payment authorisations that are then printed and sent to suppliers, customers and banks. Alternatively, the telephone may be used to take orders or relay information such as status reports and shipment tracing enquiries. Exhibit III-1 shows a typical "EDI-less" situation.

Many large companies use electronic means to transfer data to dependent suppliers, sometimes by physically shipping computer tapes or diskettes. With the increasing use of communications networks, two significant problems emerge:

- Data transfers between dominant companies and their dependent suppliers often require the trading partner to accept whatever format the large company provides. This situation forces the supplier to accept a proprietary standard, with the penalty being the potential loss of business.
- This arrangement can place burdens on programming resources, especially when a supplier must comply with the requirements of many customers.

EXHIBIT III-1



C

Reasons for Using EDI

Computer-prepared information forms a database that can be used for a variety of corporate management applications, including budgeting, accounting and forecasting, and creates benefits for many corporate departments beyond the buying and selling functions. In other words, the adoption of EDI can totally change the way a company carries out its business and in this respect, merits all the “hype” that has surrounded it over the past few years.

The “traditional” ways of preparing and managing business documents have inherent problems, the most often cited being that paper or verbal information is not directly usable by computers; that telephone ordering and order-taking are labour intensive and error prone; that reliance on the postal service slows turnaround time.

Furthermore, many companies hold safety stock to meet unanticipated needs. Whilst this improves customer service, such safety stock can slow the turnover of assets, thus reducing profits. EDI enables Just-in-time inventory techniques to be used, reducing stock-holding without reducing the level of service to the customer.

EDI also fulfills two key criteria for companies considering the implications of the single European market: firstly, that information management can be a competitive tool, and secondly, that a successful EDI installation will satisfy the requirements for increased productivity combined with reduced storage, transportation and administration costs.

The impact of EDI is greatest in those sectors where customer service, as opposed to quality, price or design, is the key differentiator. EDI provides an immediate reduction in the time from placing an order to receiving the goods, and the subsequent improvement gives immediate advantage. EDI can obviously have an indirect impact on price and quality as well, but such benefits are not easily defined.

EDI is also playing an important role in the development of “just-in-time” manufacturing, which has important implications for manufacturers and suppliers alike. Automotive manufacturers, for example, have been able to place more stock control responsibilities on its suppliers.

Reasons for using EDI are summarised in Exhibit III-2.

EXHIBIT III-2

REASONS FOR USING EDI

- Reduction in costs
- Fewer errors
- Faster turnaround
- Improved customer service
- Competitive tool
- Increased productivity
- Improved management control

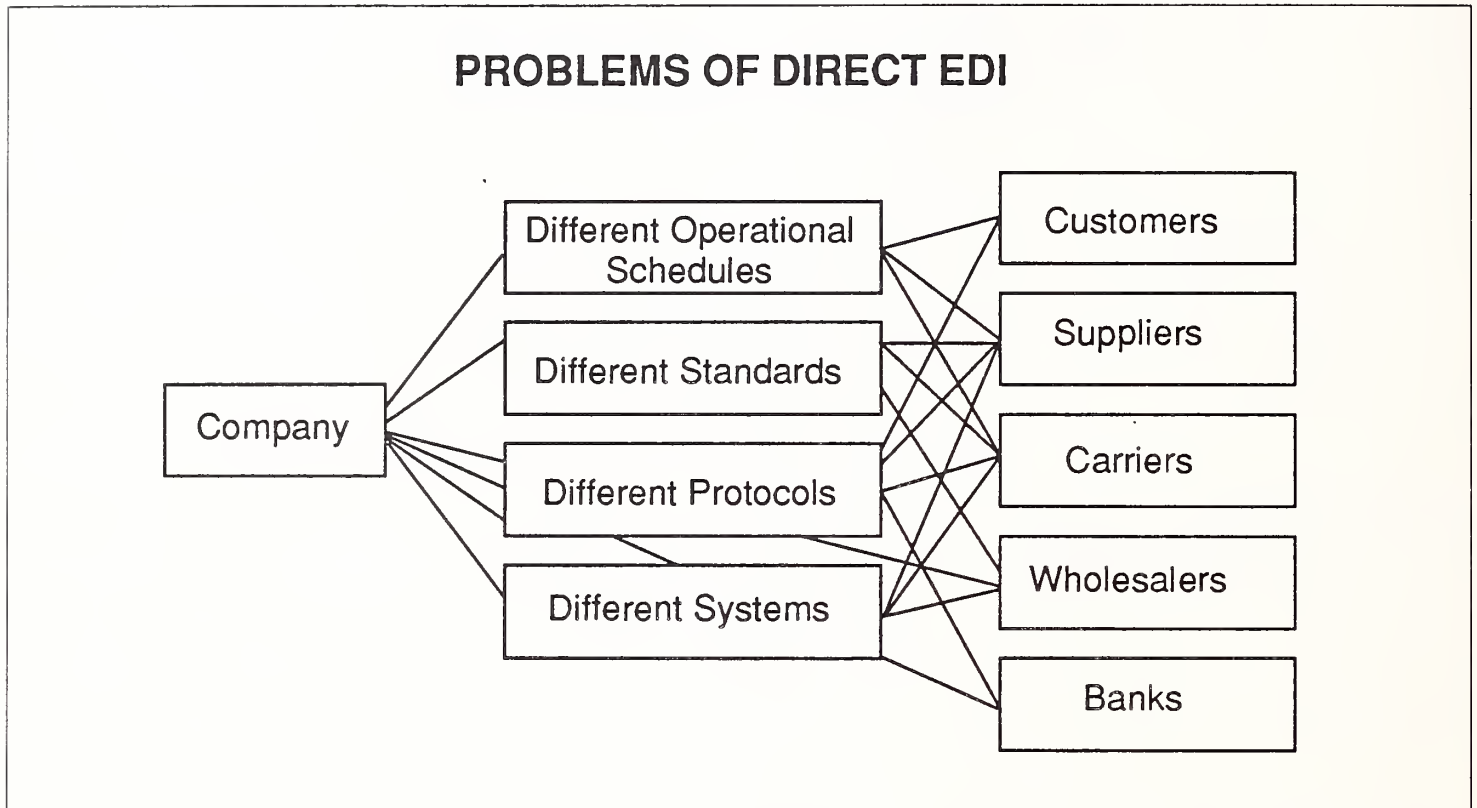
D

Approaches to EDI

A company's computer system can directly link to another company's; however, there are fundamental problems with this direct, one-to-one solution—computers may not be compatible or information may be formatted in different ways—even before considering the scheduling, auditing and network management problems that direct links inevitably cause.

Compounding these problems is the complexity of business relationships, with companies often doing business with companies from different industry sectors and in different countries. As the number of trading partners increases, this approach proves increasingly costly to support. These problems are listed in Exhibit III-3.

EXHIBIT III-3



EDI overcomes these problems by providing standards for direct or indirect links between corporate computers. There are three main approaches:

- A company may implement a private EDI network system
- Third parties can provide a mailbox store-and-forward service as well as providing conversion services for different formats or communications protocols
- An industry-association network

E

Requirements for EDI

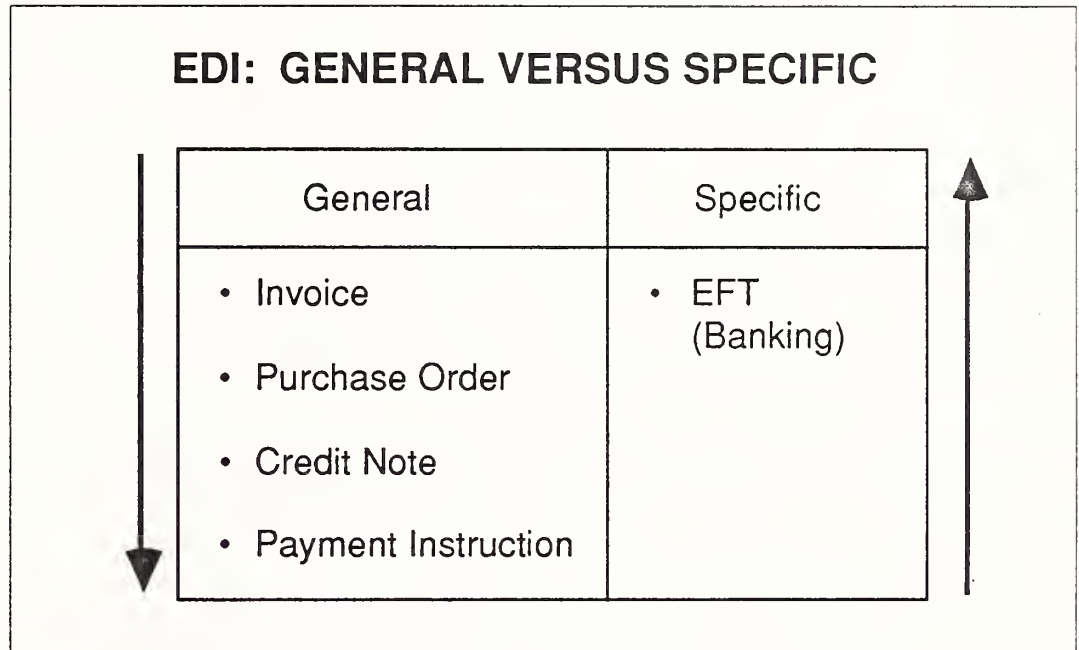
It is only when the three basic requirements for EDI—telecommunications, software and message standards—are available and established that widespread applications begin to develop. In the U.K., it was only when a stable set of message standards, capable of being securely transmitted over a store-and-forward network, was available that EDI became a strategic tool.

EDI, a transaction-based data interchange, can be divided into two types:

- **General.** Related to a business or administrative transaction such as invoice, purchase order, credit note or payment instruction.
- **Specific.** Developed for a particular and special need, e.g. EFT (electronic funds transfer) in the banking sector.

This is illustrated in Exhibit III-4.

EXHIBIT III-4



Furthermore, the three basic requirements for EDI can be broken down as follows:

- **Communications.** A method of transmitting the standard data from one computer to another.
- **Transaction software.** Software that interfaces with the in-house computer and allows in-house data to be converted to the standard representation (message standard).
- **Transaction message standard.** A standard way of representing the data in each transaction.

Standards are playing a vital role in European EDI development; message standards may be private, between two or more users; they may be those of a closed-user group or trade association; they may be national or international. However there are several components that comprise a message standard, highlighting the potential difficulty of successful market development if the standards issue is not addressed.

Exhibit III-5 lists these components and compares them with the structure of human language.

EXHIBIT III-5

THE "LANGUAGE" OF EDI

Language

- A standard method of communication
- = "Message standards"

Grammar

- Set of rules governing the structure of language
- = "Syntax"

Sentence

- Group of phrases/words arranged according to the rules of grammar
- = "Message"

Phrase

- Grouping of words
- = "Segments"

Word

- Smallest indivisible piece of "data"
- = "Data element"

Letter

- Required to represent a word
- = "Standardized code"

In the U.K. the market has developed with two different standards, one based on the ANA TRADACOMS standards and the other around the UN-EDIFACT standard. Standards need to meet the functional requirements of the user and it is perfectly reasonable for a user to start with one standard because it suits its requirements, and either to migrate to another as the requirements change or to adopt both standards, one for its national and the other for its international requirements.

What is important is that the user understands the components of message standards, analyses current and future requirements and adopts an implementation strategy that allows flexibility as circumstances change.

F**Participants**

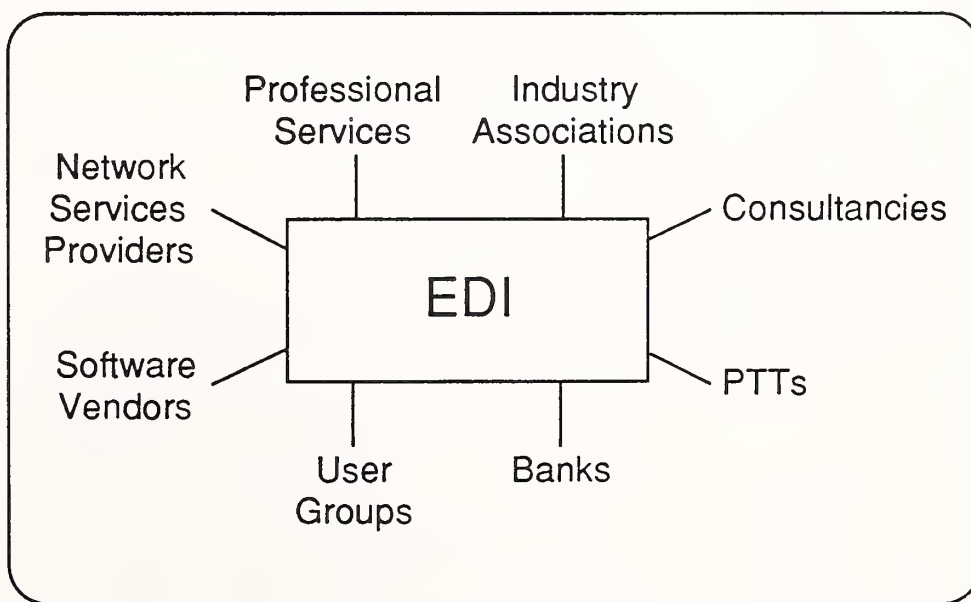
Large European organisations are now using EDI to communicate with their trading partners in order to improve customer service, increase competitive edge and reduce costs.

The “third-party service providers” offer EDI network management services, protocol and speed conversion, error correction, format translation and store-and-forward services.

Companies like INS (International Network Services), an ICL/GEIS joint venture, Istel, IBM, GEIS, EDS, the national PTTs and their subsidiaries, Infonet are all EDI service providers, whilst software systems vendors and professional services organisations such as SD-Scicon, GLI and Price Waterhouse are adding EDI functions to their products or selling EDI services provided by others.

Industry associations are playing an important role in helping to establish standards, design systems, endorse vendors and represent users’ interests. Users themselves are responding to the accelerated take-up of EDI by forming user groups, such as the one composed of users of the Tradanet network in the U.K.

Banks are belatedly seeing EDI as a cash management function and several throughout Europe are involved in EDI to varying degrees. In countries where the banks have already successfully worked together on joint projects, (e.g. France), there will be considerable efforts deployed to complete the transaction loop between EDI and EFT. Exhibit III-6 lists the different types of organisations involved in the EDI market.

EXHIBIT III-6**PARTICIPANTS IN THE EDI MARKET**

G**Software**

Companies that subscribe to one or other of the third-party networks have the choice of relying on the software hosted on these vendors' processors to perform format conversions or internally converting private or application-specific formats to industry standard formats prior to transmission.

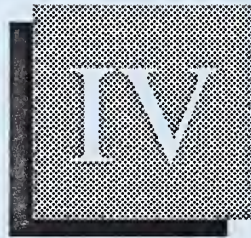
Alternatively, there are a growing number of EDI software products on the market. If the software is purchased, customisation and interfacing to internal applications will be required and can be undertaken by the software vendor, a professional services organisation, a consultancy or the user organisation itself. Currently there are three main categories of software providers, and these are listed in Exhibit III-7:

EXHIBIT III-7

SOFTWARE PROVIDERS	
Category	Comments
New	Spin-offs from consultancy firms/user organisations
Network Services Providers	Bidding to increase network traffic
Established Application Vendors	Adding EDI function to existing software

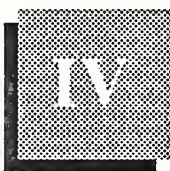
- New companies that focus on generic translators. Some of these firms started as generalised software/systems consultancies and have started new EDI software units.
- Third-party service providers whose primary goal is to increase revenues from EDI transactions through their services.
- Established business and manufacturing applications vendors that have added EDI capabilities to existing products.

Whilst network and service providers and applications developers tend to design products that integrate easily into their own networks or applications, some are marketing generic translators that compete with products from the first group.



Market Analysis and Forecast





Market Analysis and Forecast

A

Overall Growth

Electronic trading will account for a substantial part of large corporation business transactions by the end of the forecast period. There is a confluence of factors that indicate exponential EDI growth; the proliferation of computer systems, third-party marketing and service offerings, cheaper software and a growing recognition of the importance of EDI as a way of doing business, its benefits and its relevance to the development of the single European market.

B

Forecast Definition

The market assessment and forecast given below for the Western European EDI market was developed from an evaluation and an analysis of both current and projected activity.

The market assessment is provided for 1989 and forecast over a five-year period to 1994. INPUT's market assessment is of end-user expenditures. Forecasts are made in local currencies for individual country markets and converted into U.S. dollars for aggregation and comparative purposes.

The U.S. dollar exchange rates are shown in Exhibit IV-1. These rates were the average exchange rates in June 1989. The forecasts are expressed in current rates; consequently allowance must be made for the rate of inflation. The inflation assumptions made by INPUT are also shown in Exhibit IV-1.

EXHIBIT III-1

U.S. DOLLAR AVERAGE EXCHANGE RATES

Country	Currency	Dollar Exchange Rate	Inflation Assumptions
France	FF	6.4	+3.4
U.K.	£	0.6	+7.9
West Germany	DM	1.89	+3.0
Italy	It L	1393.0	+6.7
Holland	DFL	2.14	+1.0
Belgium	BF	39.7	+3.0
Sweden	SK	6.45	+6.3
Spain	PST	118.0	+6.1

Source: National Westminster Bank (June 89 rates).

C**Aggregate Market Growth**

The EDI market can be examined as the sum of its components as follows:

- Network services, including access point maintenance, error correction, protocol and speed conversions, switching, interworking through gateways, store-and-forward services. These services are typically provided by third-party service providers' networks, although private networks may provide many of these elements.

Additionally, these third parties will also provide the processing-type services, such as data field validation, data format translations, standards conversions, as well as directing electronic transactions submitted electronically in batch mode (messages for many addresses transmitted together), to their individual destinations.

- Software for translating data between EDI standards and handling communications and communications software associated with EDI transmissions.

- Professional services for systems design, software customisation, equipment selection and acquisition, systems integration, facilities management, education and training.

Aggregated market growth projections are shown in Exhibit IV-2, representing a 55% compound annual growth rate (CAGR) through to 1994. A breakdown of the 1989 EDI market components is shown in Exhibit IV-3.

EXHIBIT IV-2

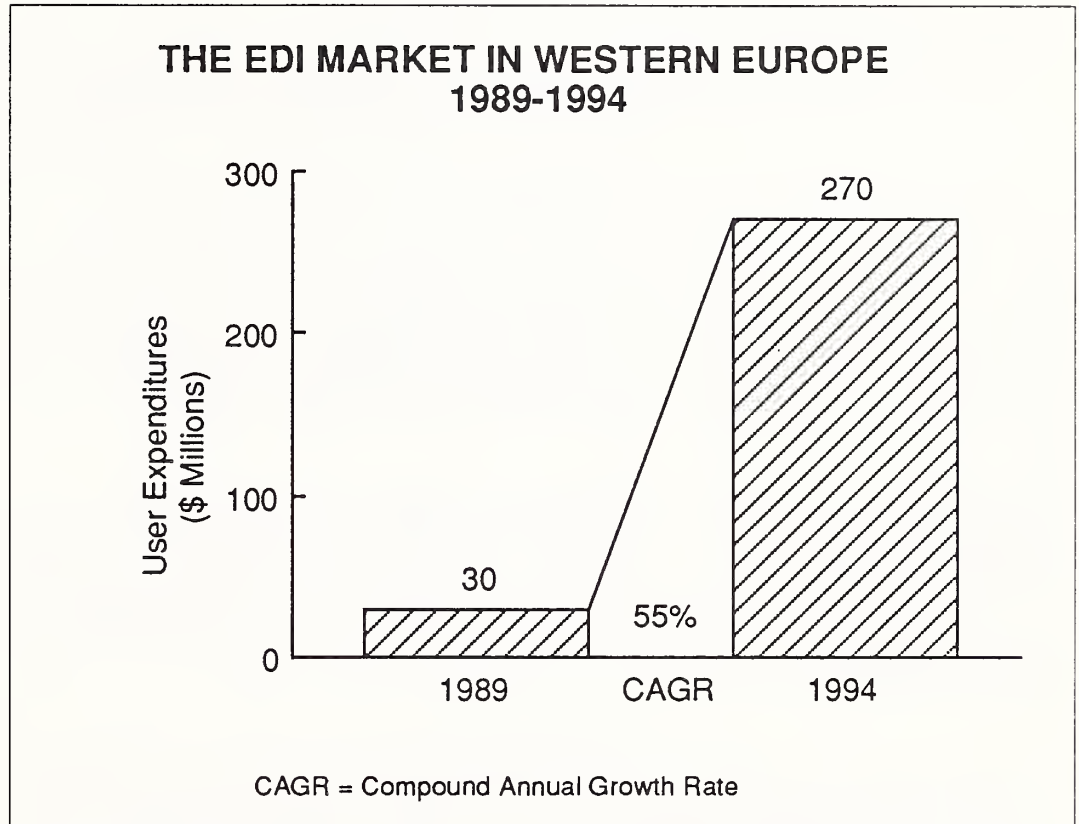
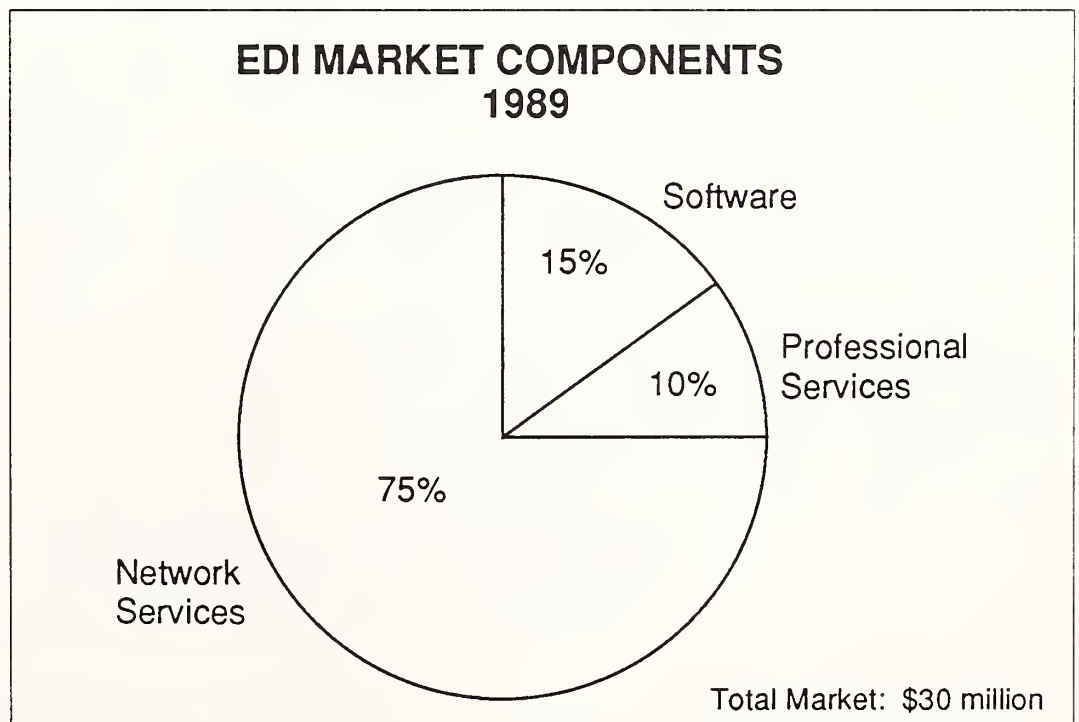


EXHIBIT IV-3



EDI growth is anticipated to continue showing spectacular advances because of the various obstacles (standards, software, networks, cost) are being outweighed by the factors driving the industry forward. Firstly, the increasing realisation that whilst EDIFACT represents considerable progress in standardising message formats, it is also important to develop initiatives in specific industry sectors. ODETTE in the automotive industry, CEFIC in chemicals, EDIFICE in electronics, the EEC's Single Administrative Document (SAD) for import/export. In other words, to get up and running.

Secondly, the availability of relatively inexpensive standard software packages for interfacing internal applications to EDI services has opened up the EDI market to smaller companies that do not possess mainframe or mini computers, but are able to perform EDI transactions on a micro.

Thirdly, the levels of deregulation in Europe have meant that other European countries are now benefitting from the network services that have been available in the U.K. for four years. These service providers fulfill an important role in their ability to interconnect EDI users within and across vertical market sectors.

D

Forecast Reconciliation

Exhibit IV-4 shows the differences between the current forecast and INPUT's 1988 EDI forecast in the report entitled, *Network Services, Western European Market Opportunities, 1988-1993*.

EXHIBIT IV-4

FORECAST RECONCILIATION

1988 Market			1993 Market				
1988 Report (\$M)	1989 Report Sizing (\$M)	Variance as Percent of 1988 Report Forecast	1988 Report Forecast (\$M)	1989 Report Forecast (\$M)	Variance as Percent of 1988 Report Forecast	1988-1993 CAGR Percent in 1988 Report	1989-1994 CAGR Percent in 1989 Report
40.0	30.0	(25)	250	210	(16)	44	55

The market was overstated last year due to the nature of large, private EDI implementations that were considered to involve more third-party expenditures than is actually the case, as well as the inclusion of projects

that are considered EFT applications rather than EDI. Growth remains high however, for the following reasons:

- The market is starting from a low base.
- The large number of pilot projects currently in operation throughout Western Europe will move on to full EDI implementations with the consequent addition of “spokes” to the “hub”.
- Use will grow commensurate with experience. Additional transactions by users and new use by their trading partners will account for this growth.
- Early private EDI implementations will become fully open or have gateways between private and public services, placing more user expenditures in the available non-captive market.
- Integrated EDI software from the major mainframe software vendors and EDI add-on modules from secondary sources will become available.

On the other hand, user expenditures are expected to moderate towards the end of the forecast period even though transaction growth will continue at high rates. This will be as a result of competition between vendors which will lead to price cuts, automatically reducing user expenditures. Furthermore, discounting will follow higher volume transactions.

E

Western European Market

The total market for EDI software and services provided by third-party providers within Western Europe is anticipated by INPUT to reach a level of \$30 million by the end of 1989 and to grow at a compound annual growth rate of 55%, reaching a total of \$270 million by the end of 1994, as illustrated in Exhibit IV-2.

The majority of the EDI software and services market comprises network services, with 15% of the market attributed to EDI software and with the balance held by professional services. This is shown in Exhibit IV-3.

INPUT anticipates that the network services sector will continue to represent the largest slice of the total EDI market throughout the forecast period, with the software share decreasing as the market stabilises along pan-European lines. However, in the period 1989-1991, INPUT expects the market to almost double in size each year as the large private EDI implementations move into the third-party market. The steady growth of EDI over the forecast period is illustrated in Exhibit IV-5.

EXHIBIT IV-5

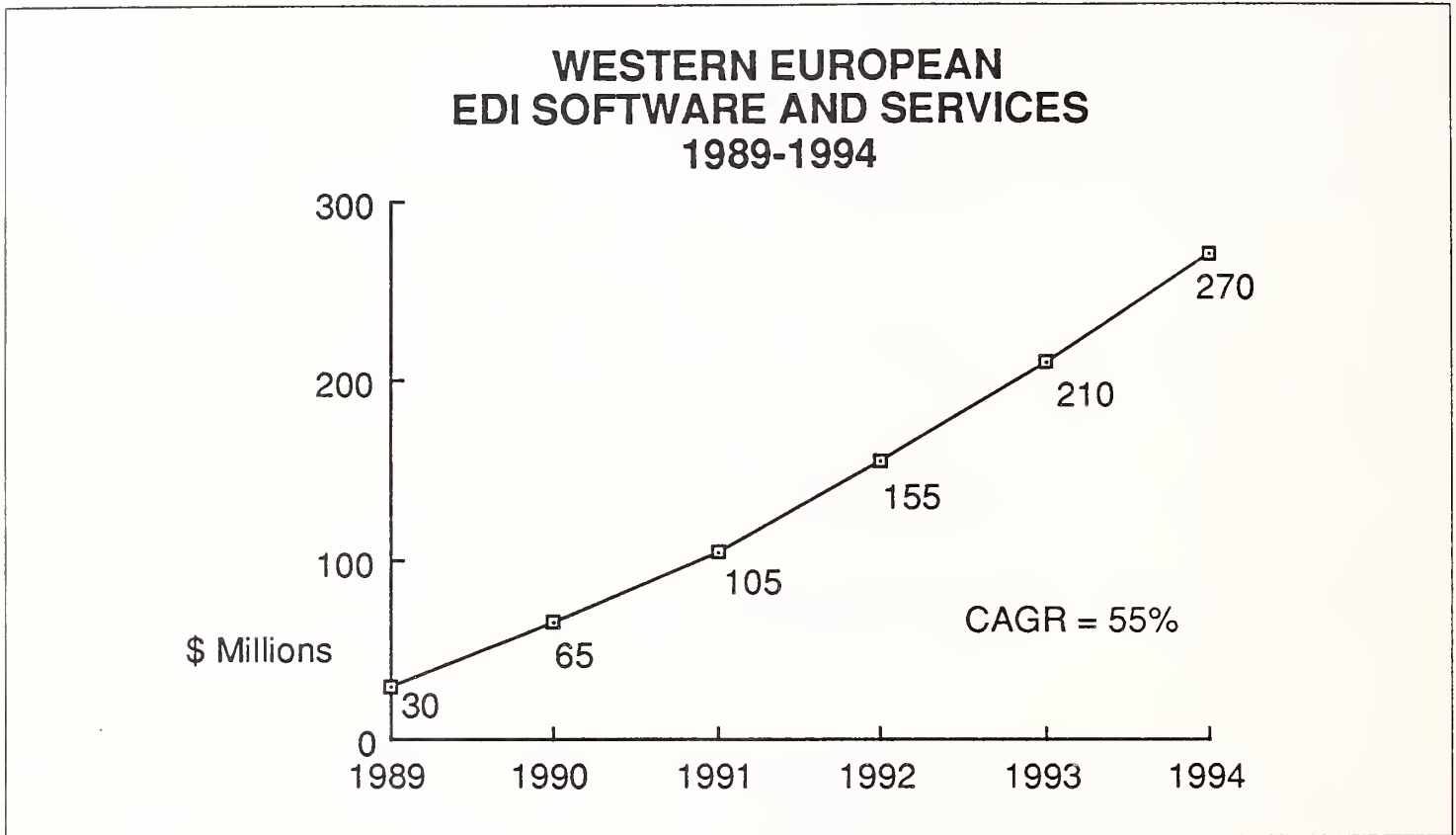


Exhibit IV-6 shows the overall analysis of the EDI software and services market by the individual country markets. A more detailed discussion of these individual country markets is provided in Chapter V of this report. Currently the U.K. holds over 50% of the total EDI market. By the end of the forecast period the market is expected to be dominated by the three largest economies in Western Europe, U.K. (28%), France (20%) and West Germany (18%). Exhibit IV-7 illustrates the shift in market share between 1989 and 1994.

Exhibit IV-8 provides a detailed breakdown of anticipated user expenditures by individual country market for 1989 and the expected five-year growth pattern through to 1994.

EXHIBIT IV-6

THE EDI MARKET IN WESTERN EUROPE 1989-1994

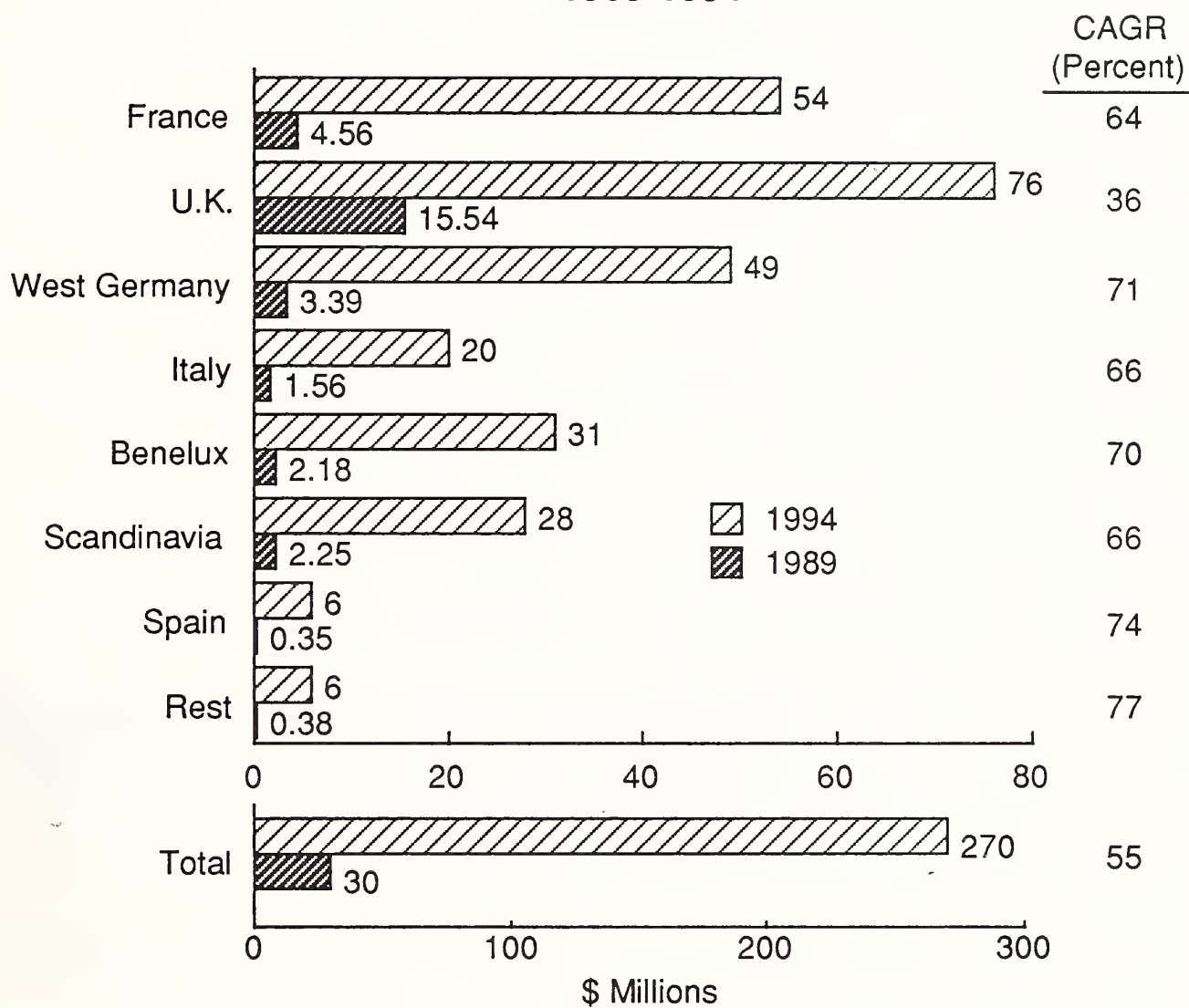
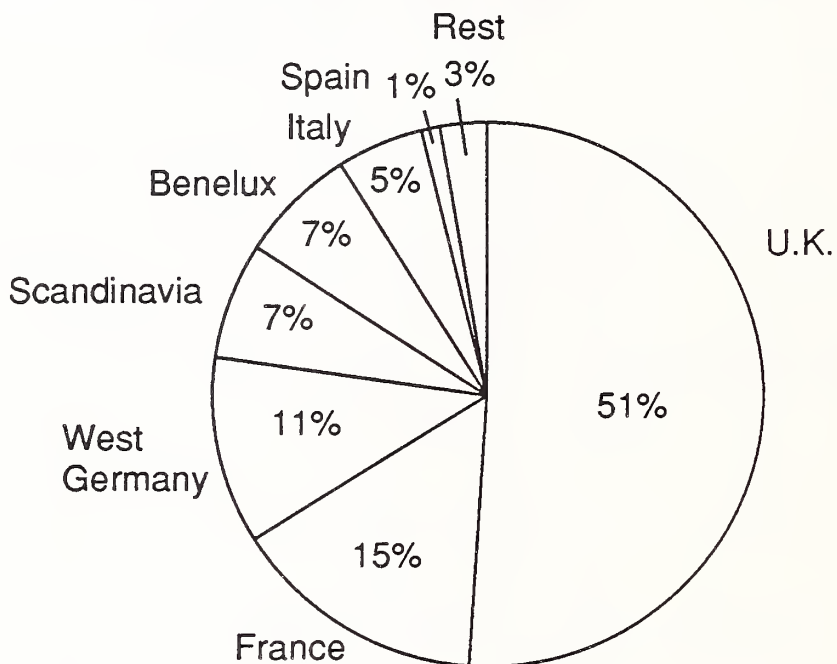


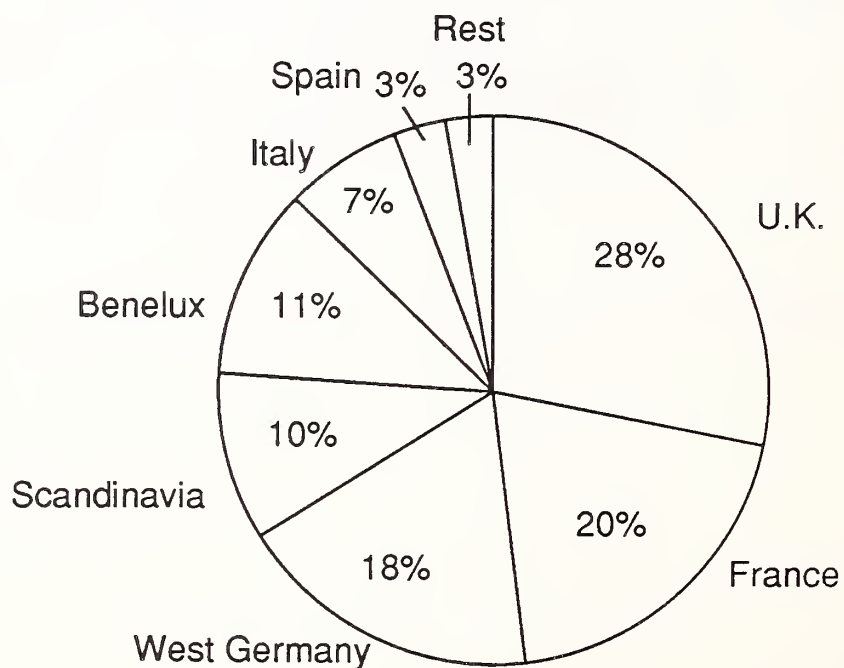
EXHIBIT IV-7

WESTERN EUROPEAN EDI SOFTWARE AND SERVICES MARKETS BY COUNTRY, 1989



1989 Market: \$30.21 Million

WESTERN EUROPEAN EDI SOFTWARE AND SERVICES MARKETS BY COUNTRY, 1994



1994 Market: \$270 Million

EXHIBIT IV-8

WESTERN EUROPEAN EDI SOFTWARE AND SERVICES COUNTRY MARKETS, 1989-1994

	User Expenditures (\$ Million)						
	1989	1990	1991	1992	1993	1994	CAGR (Percent)
France	4.56	10	18	28	39	54	64
U.K.	15.54	25	37	50	62	76	36
West Germany	3.39	8	16	25	36	49	71
Italy	1.56	4	6	9	15	20	66
Benelux	2.18	5	9	15	23	31	70
Scandinavia	2.25	5	8	14	21	28	66
Spain	0.35	1	2	3	5	6	74
The Rest	0.38	2	4	5	5	6	77
Total (rounded)	30	65	105	155	210	270	55

The comparative vertical market sector analysis is shown in Exhibit IV-9. The benefits of EDI in reducing costs and improving stock control and customer service is reflected by its dominance in the manufacturing, retail, distribution and transportation sectors of the Western European market.

Exhibit IV-10 gives a detailed breakdown for the market by industry segment in 1989 and a forecast through to 1994. INPUT forecasts that the highest growth will be experienced in the manufacturing sector—as industry invests to contain production costs in the face of increased European and international competition—and in the distribution and transportation sectors, where the implications of the single European market will be felt most acutely.

EXHIBIT IV-9

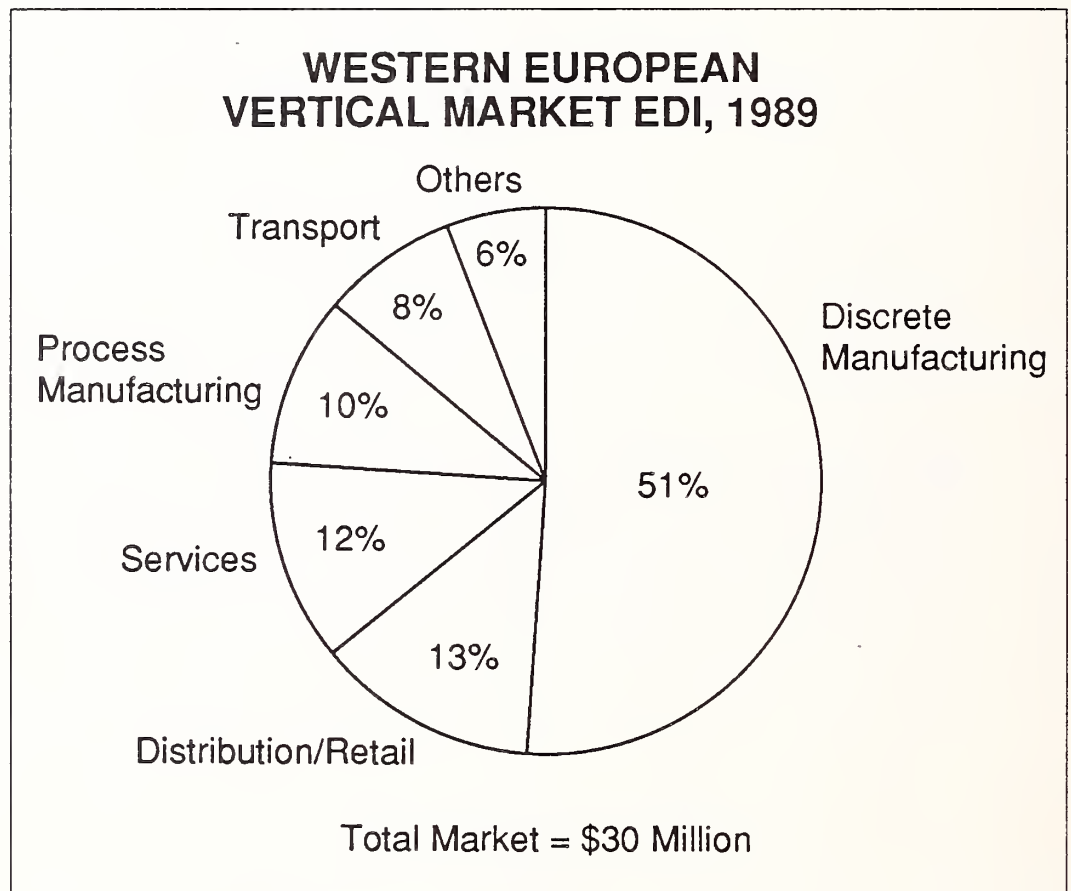


EXHIBIT IV-10

WESTERN EUROPEAN INDUSTRY SEGMENT
EDI EXPENDITURES, 1989
(\$ Millions)

Vertical Sector	France	U.K.	WG	Italy	Benelux	Scandi- navia	Spain	Rest	Total
Discrete Manufacturing	2.5	7.5	2.3	0.9	0.5	0.9	0.3	0.3	15.2
Process Manufacturing	0.1	2.3	0.2	0.1	0.1	0.1	-	-	2.9
Transportation	0.3	0.5	0.3	0.2	0.7	0.5	-	-	2.5
Utilities	0.1	0.3	0.1	0.1	0.2	0.1	-	-	0.9
Telecom- munications	0.3	0.1	-	-	0.2	0.1	-	-	0.7
Distribution (Retail)	1.0	1.3	0.3	0.2	0.4	0.5	0.1	0.1	3.9
Banking (Financial Services)	0.1	0.1	-	-	-	-	-	-	0.2
Insurance	0.1	0.2	-	-	-	-	-	-	0.3
Medical	-	0.2	-	-	-	-	-	-	0.2
Education	-	-	-	-	-	-	-	-	-
Services	0.1	3.0	0.1	0.1	0.1	0.1	-	-	3.5
Government	-	0.1	-	-	-	-	-	-	0.1
Other	-	-	-	-	-	-	-	-	-
Total	4.56	15.54	3.39	7.56	2.18	2.25	0.35	0.38	30.0

FCompetition

The leading vendors in the EDI software and services market are listed in Exhibit IV-11. This is an estimate of the user revenues that will be derived by vendors in 1989 and their expected market share.

INS (the ICL/GEIS) joint venture emerges as a clear market leader due to the success of its Tradanet network in the U.K. Istel, another U.K.-based network services provider, is in second place due to its strong presence in the manufacturing sector. GEIS appears in a different guise in third place, due to its network reach across Europe and its positioning as a network that provides European coverage.

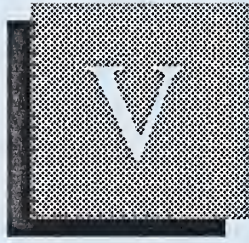
Caution should be exercised when drawing conclusions from the lower end of the rankings since positioning is highly dependent on the contract situation and the position of closed user groups. EDS, for example, a relative newcomer, is building a continent-wide EDI network for its parent company General Motors, designed to link 2,000 computer systems in seven countries, using Istel in the U.K., Transpac in France, and GEIS in West Germany, Italy, Spain and Benelux. Once this network is set up, EDS will sell capacity on it to other commercial users. Such a service will have a huge impact on the size of the West European EDI market, adding 2,000 companies to the existing user base of around the same number.

EXHIBIT IV-11

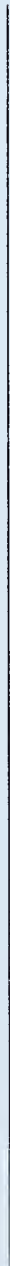
LEADING VENDORS WESTERN EUROPEAN EDI MARKET

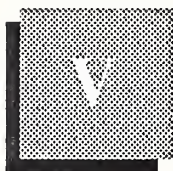
Rank	Vendor	1989 Anticipated EDI Revenues (\$ Millions)	Market Share* (Percent)
1	INS	8.5	28
2	GEIS	6.4	21
3	Istel	3.5	12
4	IBM	3.0	10
5	SD-Scicon	1.6	5
6	GSI	1.2	4
7	EDS	1.0	3
8	Bull	0.5	2
9	Hewlett Packard	0.4	1
10 =	Digital	0.3	1
10 =	Transpac	0.3	1
10 =	Philips	0.3	1
	Others	3.0	10
TOTAL		30.0	100

*Rounded



Market Environment





Market Environment

A

Development Forces

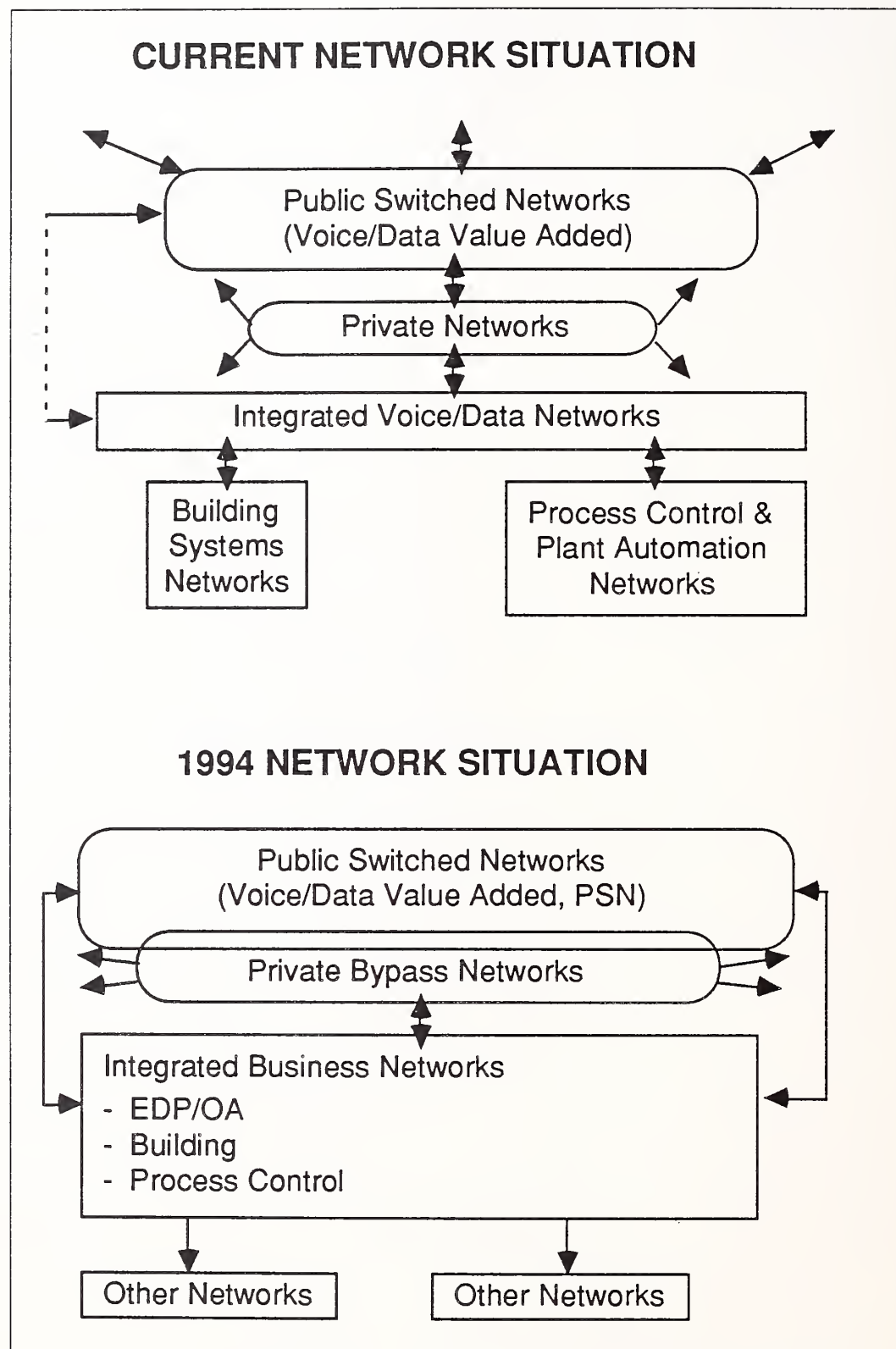
1. Western European Network Environment

The structured transfer of data between trading partners or even just computers is a form of EDI. However, this type of electronic communication acting as an accelerated postal service provides little inherent added value. The real advantage of EDI is that it enables both the initiator and the recipient to automate the interface between communications and their own internal business procedures—be they manufacturing, administrative or distributive. When companies take this approach, there are immediate and significant gains from unit cost reduction as well as a large reduction in response time to market requirements.

As Western Europe moves towards “internationalisation,” fully integrated networks linking voice and data communications with the business use of data processing, office automation, building controls, process control and other types of networks, by market segment, will be combined through a mixture of private bypass and public switch (virtual) networks to provide a complete capability for network communications. This overall evolution is summarised in Exhibit V-1.

Currently, the existence of a large number of private EDI networks is working to retard the market by slowing acceptance of standards, limiting trading relationships and excluding potential participants.

EXHIBIT V-1



However, this situation is likely to change during the forecast period, 1989 to 1994, and can be attributed to three major factors that are causing an increasing shift toward a full commitment to network technology and systems in Europe.

- Deregulation of the public telecommunications network
- Blurring and lack of technological distinction between data processing, office automation, telecommunications and control systems technology through the common use of network-oriented microprocessor-based systems
- The growing dependence and commitment to the network and the network “backbone” as a framework for conducting business

This changing structure of the network systems application and use across the major Western European industrial market segments indicates the growing commitment to, and use of, networks and network technology involving both private networks and the application and use of public switched services. However, organisations are turning increasingly towards a new class of supplier: one that can offer a broad integrated array of network systems based services for design and engineering, installation, maintenance and repair. This organisation must be equipped to provide both voice and data services on a standalone or an integrated basis and must be capable of making the most efficient utilisation of both private network equipment technology and the public switched network services.

Demand for such services will grow rapidly; in addition, there appears to be a high cross-elasticity of demand between network services and network products. The customer is suggesting that service is more important than the product technology, and thus a service strategy can increasingly generate product sales.

A network-based service portfolio for integrated design, installation and maintenance services as a strategic line of business can offer significant revenue and profit potential on its own and as a mechanism for generating product sales and public switched network service sales. This new strategic focus and positioning requires a carefully constructed portfolio of services at pricing levels reflecting different levels of service commitment and delivery for each individual market segment.

Such a network service strategy can be adapted and efficiently developed by the deregulated PTTs, by the major hardware-oriented network and data processing developers such as IBM, Digital and Bull and by the major multinational networks such as GEIS and EDS who are already offering network systems integration and service support as a line of business. It is within this strategy that EDI plays an important part.

2. Critical Mass

Growing use of EDI in Western Europe will lead to increased opportunities for professional services firms as well as hardware, software, turnkey and communications vendors.

Smaller companies need to be included in EDI services since they often create more expenses to suppliers' order processing than larger companies, in relationship to order size.

More micros, communications equipment and software will be needed by smaller companies to take advantage of EDI services and to meet the requirements of major trading partners for suppliers with EDI capabilities. The growth of microcomputers for EDI implies increasing demand for micro-EDI software.

For the financial and operating benefits of EDI to be realised, a critical mass of trading partners is crucial. It is only when this stage is reached that the paper-based operations can be reduced. INPUT's user research has indicated that some larger organisations have addressed this requirement (for critical mass) by forcing suppliers to adopt EDI. In some cases, the user organisation has been ill-prepared for the changes proposed.

Because there is pressure on vendors and users alike to attain critical mass as soon as possible in order to realise the economic benefits associated with EDI, there has been a mismatch between the services marketed by the service providers to potential users. Users are often unable to see or exploit any benefit, especially in cases where they cannot see any value added to current business processes.

This situation is rapidly changing as critical mass is attained and as vendors and large users use a more consultative approach to those who are sitting on the fence. This has resulted in a more mutually beneficial approach, certainly in the long term, where the emphasis is placed on education, with benefits highlighted and analysed. In France over the past year, pilot projects have been used as a means of verifying the operation of the interface between existing systems and the EDI link and to refine the operating cycle.

Within the context of the single European market, EDI has an important role to play in supporting competitiveness, economies of scale, rationalisation as well as cooperation in the developing international arena. Where pan-European networks are in place and in sectors where critical mass has been achieved, EDI provides a common business practice which transcends national, geographical and cultural barriers. This provides only companies that have already adopted EDI with considerable competitive advantage.

3. Standards

a. EDIFACT

Most European countries have trade facilitation bodies formed by major shippers and related service and government agencies. Exhibit V-2 lists these organisations.

EXHIBIT V-2

TRADE FACILITATION BODIES

Country	Organization	Address/Phone
Belgium	Siprocom	Office Belgique du Commerce Extensive World Trade Center Boulevard E. Jacqmain 162 B-1000 Brussels (32-2) 2194550
Denmark	Danpro	NC Andersens Boulevard 18 1596 Copenhagen V (457) 152233
Finland	Finpo	FFTA Arkadigatan 4-6B 00100 Helsinki 10
France	Simprofrance	61 rue de L'Arcade 75008 Paris (33 1) 42-93-03-02
Italy	Italpro	Ministerio delle Finanze Studi della Legislazione Piazza Marconi 25 00144 Rome
Netherlands	Sitpronetm	Nederlands Normalische-Imtbrit Postbus 5059 2600 GB Delft (31-15) 611061
Sweden	Swepro	PO Box 450 40127 Gottenberg (46-31) 637277
West Germany	Devpro	Bundesministerium für Wirtschaft Postbox 140 260 5300 Bonn (49-228) 6151
UK	Sitpro	Almack House, 26/28 King St. London SW14 69W (44-1) 930-0532

However, in the area of EDI standards, one of the problems with standards development is that multiple parties have differing needs. Each industry or large user has unique requirements that must be considered in the standards development process. Consequently, there are subtle variations even in the basic standards that have to take into account factors such as special billing requirements, differing measurements as well as shipping instructions.

This situation often leads to lowest common denominator standards and duplicate transaction sets covering the same type of electronic documents, but with different formats. This problem is compounded in Europe with each country developing national standards, industry-specific standards and private EDI standards.

Until 1987, international standards were called General Trade Document Interchange (GTDI), endorsed by a United Nations Committee and having evolved from the U.K.'s Trade Facilitation Board. An earlier coordinator of various industry and international groups was called the Joint Electronic Data Interchange Committee, known as JEDI.

However, JEDI's activities have been superseded by the UN Economic Commission for European Working Party on Facilitation of International Trade Procedures. Now the international standard is known as EDIFACT (EDI for Administration, Commerce and Transport). The structure of the EDIFACT board is given in Exhibit V-3.

EDIFACT encompasses the capabilities of the U.S. ANSI X12 standards and provides additional functions for international use. In late 1987, the ANSI X12 committee endorsed the efforts of the UN committee and started a process to bring U.S. EDI standards into synchronisation with international standards. This syntax, or basic "grammatical" framework, has been approved by the International Standards Organisation.

Exhibit V-4 shows EDI standards and their relationships, with the shaded intersections representing the degree of compatibility. Note that the shaded outer circle in the referenced exhibit represents the X.400 standard. This international messaging standard is likely to eventually encompass the subspheres of EDI by placing the EDI messages within an X.400 "envelope."

INPUT believes that multiple standards will not represent a significant impediment to international EDI. Standards supporting international trade are increasingly available, and the work of the UNECE is proceeding fairly rapidly. Furthermore X.400 will work to overcome incompatible systems and support internetwork communications.

EXHIBIT V-3

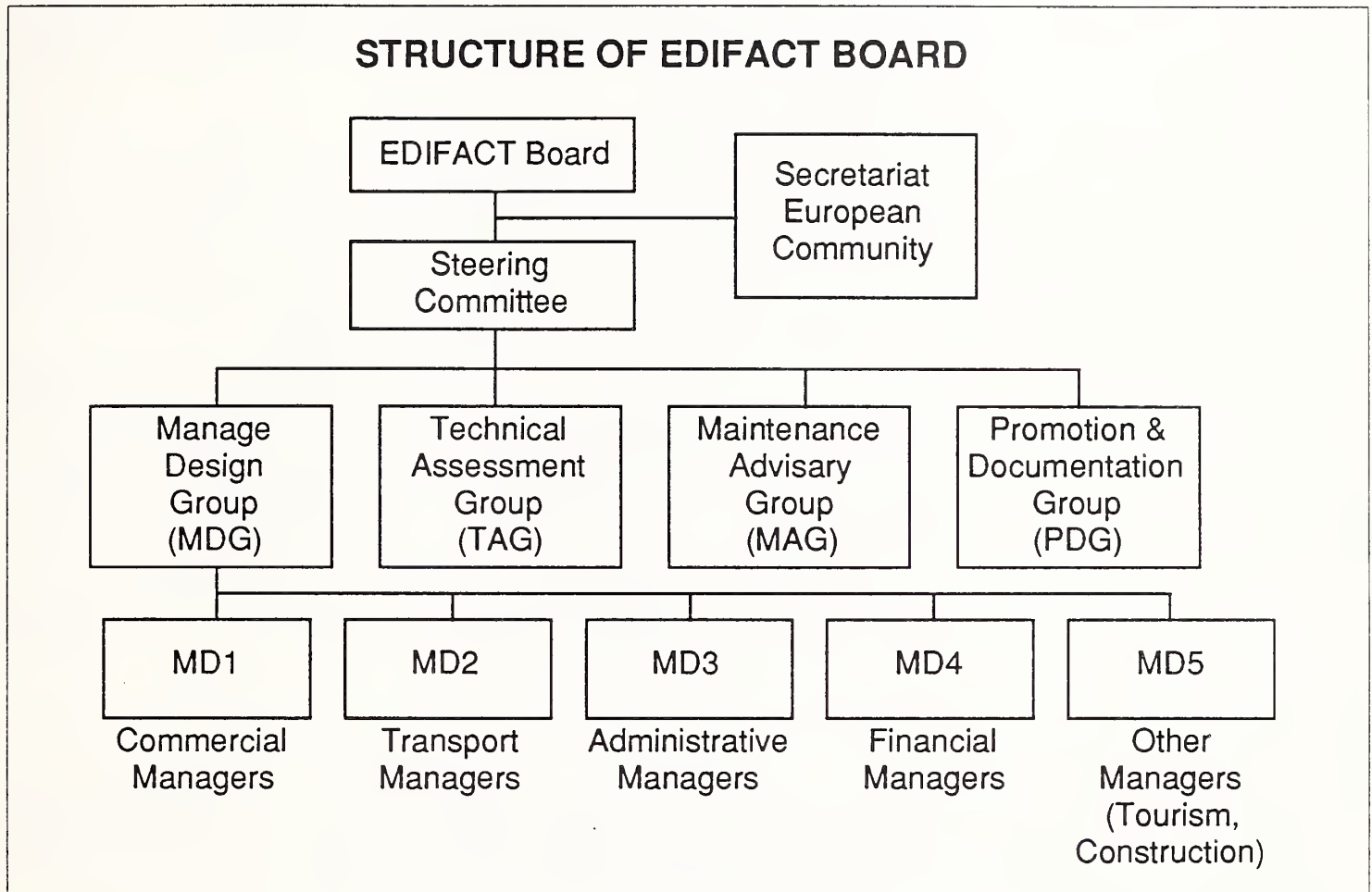
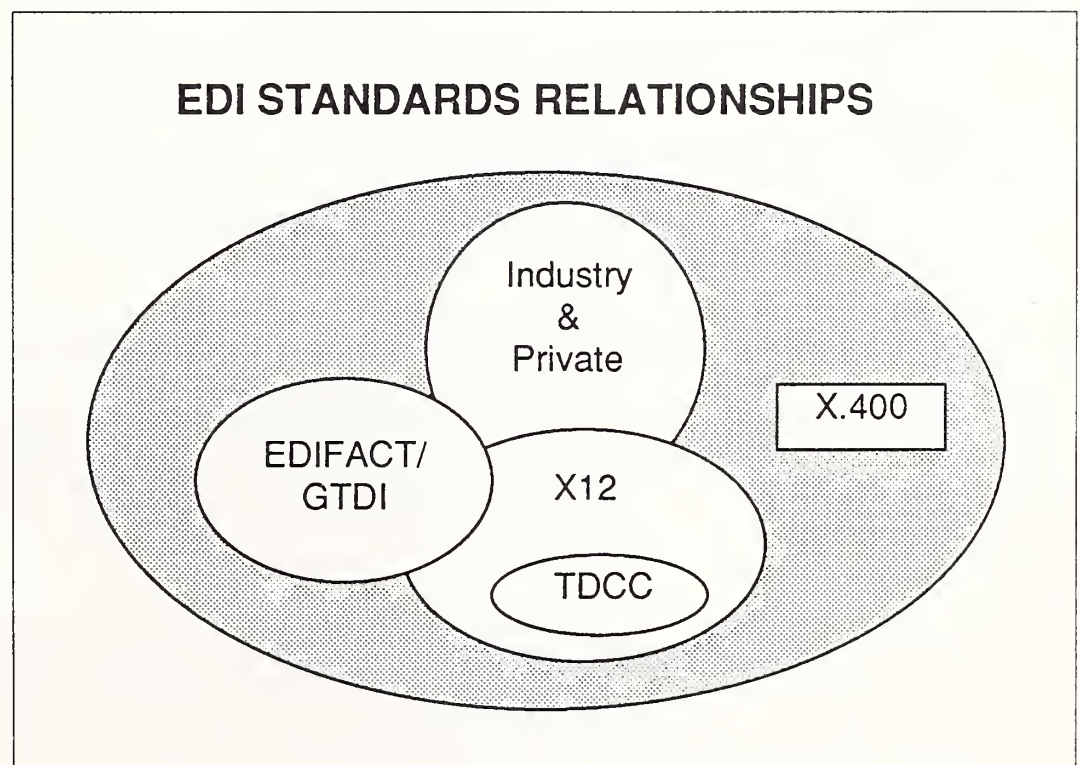


EXHIBIT V-4



There is also the question of differing EDI standards. West Germany has Teletex, heavily promoted by the Deutsche Bundespost, whilst the U.K. has adopted the GTDI (guidelines for trade data interchange) syntax specification promoted by the Board for the Simplification of Trading Procedures (SITPRO).

In the rest of Europe, where the EDI market is less mature—the U.K. with an installed user base of 2,000 leads mainland Europe whose user base stands at less than 1,000—many companies are attempting to move straight to EDIFACT. This however, in view of the low number of transaction sets available, is slowing the development of the EDI market.

The lack of agreement and coordination between member countries has opened the way for the U.S. companies, GEIS, EDS and IBM. By not being associated too strongly with any one European country they have managed to avoid getting entangled in the internal rivalry that is still a strong factor amongst the member states of the European Community. And by not being allowed to operate their own circuits, they have become experts at negotiating the obstacle course of cross-border telecommunications within Europe. Most crucially, they cater to multinationals, precisely those who are pioneering pan-European EDI.

b. X.400

Outside the U.K., in mainland Europe, many EDI users in France, West Germany and Scandinavia have opted to use public EDI services rather than exchange messages directly, for three basic reasons:

- There is no single protocol accepted by all users in the industry.
- The cost of operating direct communication networks under any of these protocols is high.
- Many companies are reluctant to connect their sensitive host processors directly to communications networks.

When using a public service, the end user establishes a single session with the service provider and sends EDI interchanges for multiple trading partners and then retrieves all interchanges sent by its trading partners. The service provider acts like a post office by sorting the interchanges and placing them into mailboxes for specific trading partners. In this way, an EDI user has to call the public service only once or twice daily to perform all EDI functions.

In 1984, the X.400 Message Handling Standard was approved by the International Telephone and Telegraph Consultative Committee (CCITT) as a standard that would allow incompatible electronic mail systems to exchange messages.

X.400 is a high-level communications protocol that specifies how messages are exchanged between two computers and is part of the growing trend towards open systems integration. Exhibit V-5 shows the OSI Reference Model, which identifies the seven levels of communications and computing systems. X.400 functions at the seventh level of the model, whereas the low-level protocols operated by most EDI users function at the second level.

EXHIBIT V-5

OSI SEVEN-LAYER REFERENCE MODEL

7-	Application	High-Level Applications like E-Mail	Application	-7
6-	Presentation	Protocol Translations	Presentation	-6
5-	Session	Coordination of Sessions	Session	-5
4-	Transport	Transfer of Files across the Network	Transport	-4
3-	Network	Transfer of Bits across the Network	Network	-3
2-	Links	Transfer of Bits over a Connection	Links	-2
1-	Physical	Physical Connection	Physical	-1

X.400 will add two very important capabilities to electronic messaging networks. First, it will provide reliable transport of messages between different message systems, complete with an electronic audit trail. Second, it will enable a worldwide directory of electronic mail users to evolve via its companion X.500 directory standard.

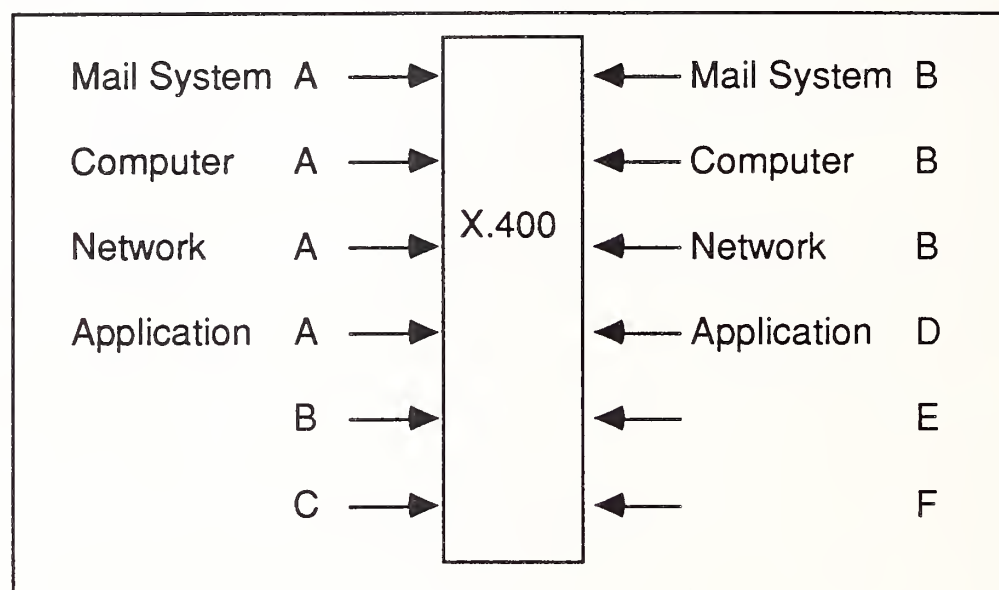
Because X.400 will substantially increase the intelligence of communication among different electronic mail services, there has been speculation that X.400's benefits can be extended to EDI. In September 1988, the International Telephone & Telegraph Consultative Committee (CCITT) formed a committee to create a modification to X.400 that will allow it to handle EDI documents. The committee plans to have a working version ready by the end of 1989.

X.400 is a powerful communications protocol that will be used by today's public service providers to replace the Open Mailbox interconnections. Even though the Open Mailbox scheme works well, X.400 will improve reliability through audit trails and will also facilitate international EDI.

X.400's main benefits can be summarised as follows and are illustrated in Exhibit V-6:

EXHIBIT V-6

X.400 BENEFITS— A GATEWAY BETWEEN DIFFERENT SYSTEMS



- Serves as a reliable gateway, so that mail systems from different vendors can exchange information in a standardised environment
- Enables companies to communicate with customers and suppliers without forcing everyone to use the same mail system or without compromising internal security
- Allows companies to develop a private network that links computers from multiple vendors
- Allows companies to plan and implement messaging systems on a decentralised basis across different networks without compromising compatibility
- Possesses the capability of evolving into a single network architecture for a wide variety of non-interactive business applications, including personal messaging, document distribution, funds transfer, database information transfer, financial planning across multiple locations and of course, EDI

To many communications companies and certain EDI users, X.400 will solve what is perceived as a growing problem associated with EDI interconnectivity. However, many organisations currently involved in EDI have no perception of a problem and thus there is no consensus as to X.400's relative value.

In conclusion, it should be stated that X.400 is very much a nascent technology in its first stages of implementation and whilst it is supported by virtually every computer and communications company in the industry, it will be several years before its implementation becomes widespread and probably another year before the CCITT will adopt formal recommendations to integrate EDI and X.400.

Secondly, EDI's present method of communications works well for most users and as such, X.400 must be viewed as a long-term communications technology that will eventually become a worldwide standard. As if to stress this, it is worthwhile noting the computer and communications organisations that have implemented X.400. These include:

IBM, GEIS, Digital, Bull, INS, Data General, Hewlett-Packard, AT&T, BT Dialcom, France Telecom (Transpac), Deutsche Bundespost and Telenet have either X.400 systems or have implemented X.400 in their electronic mail services.

4. Cost Benefits

According to INPUT's U.S. user research, savings due to EDI may be as much as \$27 per transaction cycle (order, acknowledgement, delivery note, invoice). More importantly, the time taken for the order-to-invoice cycle can be cut from around 14 days to 3 days, generating significant savings in stock and improvements in cash flow.

However, substantial savings for all organisations from EDI will not occur until a higher proportion of the total document processing load are sent via- EDI, and linked to EFT. This is not to say that significant cost savings cannot be achieved: there are many examples of large retail organisations eliminating the need to rekey huge numbers of invoices on a daily basis.

However, EDI's prime benefit is not cost saving. Improved cash flow, improved stock control and improved management information and control are the key benefits.

Thus far, the beneficial impact of EDI has been direct and anticipated. However, future and more indirect effects include information overload and function deskilling as well as the natural decentralisation that is slowing occurring throughout organisations.

Early adopters of EDI that have reaped the early rewards of cost reduction are now creating new trading structures, which will result in significant cost benefits.

5. National versus International

The major obstacle to pan-European EDI is currently the divisions between the 12 member countries. The various European countries have adopted their own approaches to EDI without coordinating their activities with their neighbours. Whilst the U.K. actively promotes EDI, allowing ease of import and export of electronic data, West Germany, for example, has sustained protectionist measures aimed at prohibiting foreign suppliers from gaining a dominant position in domestic markets.

There are over 40 groups working on EDI message sets in Europe alone. The reason being that the needs of a company engaged in high volume trading of consumer goods are completely different from a company engaged in international distribution.

Whilst EDIFACT is intended to supercede other standards by promising universal compatibility for EDI users worldwide, at the moment it is still quasi-conceptual and the majority of users are keen to protect their investment in the existing formats. The solution in the U.K. is a peaceful coexistence. With TRADACOMS being the most used standard for domestic trade and 90% of trade being contained within the U.K., at this stage all that is required is for TRADACOMS to continue as the standard for domestic transactions and EDIFACT to be used for international communications.

6. Industry Associations

These associations have been a prime driving force in the pan-European development of EDI. A listing of the major groupings are listed as Exhibit V-7.

The fundamental benefit of organisations such as the EDIA (EDI Association for International Trade and Transport) or ODETTE (Organisation for Data Exchange by Teletransmission in Europe) is the cooperation between different sectors within an industry to work together to word a set of common objectives.

Members of an industry association—usually competitors—work together to define the messages required, using whatever is available internationally insofar as syntax and message standards are concerned; this will be carried out by development groups that mirror the different sectors of the industry.

EXHIBIT V-7

EDI ACTIVITY FOUND IN MOST INDUSTRIES

Format Subset	Industry Segment
ODETTE	Automobile Manufacturing
CEFIC	Chemicals
EDICON	Construction
EDIFICE	Electronics
TRADACOM	Retail
DISH	International Trade & Transport

However, in many industries across Western Europe, EDI can best be generalised as in the pilot phase. Whilst several individual companies and market segments have gone beyond this stage, they are still using a limited number of transaction types and few have fully integrated EDI with other applications such as accounting, cash management, inventory control and shipping-related functions.

As a result, whilst growth will be substantial over the forecast period, INPUT believes that optimisation by the majority of industries now active in EDI will occur late in the forecast period and beyond.

B

Issues

1. Security

EDI's growth may be hampered by the issue of security. Business messages are inherently confidential and companies are cautious about linking their computers to external systems.

Whilst network/data security was given the highest rating in INPUT's user survey (see Exhibit V1-1), this concern is not shared by vendors and INPUT does not consider security to be an issue that will hinder EDI's development in the same way that the standards issue has. There are adequate security procedures available (encryption, authentication etc.) that are already applied to networks carrying high-value funds transfers, for example.

INPUT considers that there are three elements to be treated when evaluating the security of an EDI implementation; the communications link, the systems and procedures used for transmitting and receiving at each end of the link and interactions between EDI systems and in-house systems. These should be measured in terms of physical, technical and contractual security.

EDI is no different from any other computer installation where a level of security is required. Physical access to equipment should be controlled; access should be restricted and multiple-access authorisation should be used where appropriate. Access to the service should be technically regulated by:

- Log-in procedures, requiring a terminal identifier and user password or authorisation code
- Message authentication codes that indicate a message's point of entry onto the network
- Encryption
- Limit codes that specify the maximum number (value) of transactions
- Audit trails
- Acknowledgement messages

2. Legal

The risks in EDI transactions include transmission errors, faulty data, failed communication, unauthorised disclosure to third parties, interception during transmission and transmission to the wrong parties. Consequently, vendors must consider the legal implications of EDI transactions as EDI replaces paper documents, a medium that enjoys a long history of support under the law as a carrier of legal information, with a new electronic medium, the status of which is not well defined by the law.

There are questions about who is liable for transmission errors and as a consequence the topic is receiving increased attention from associations, standards committees and vendors because the legal uncertainties could stifle the EDI market. EDI uses technology to form a business contract that has a high level of legal content, so it should have commensurate attention paid to the legal implications.

IS managers should be educating legal departments about EDI technology, monitoring legal developments and reviewing internal procedures and trading agreements with an interdisciplinary team of technical, managerial and legal experts.

EDI is a classic case of technology advancing faster than the law. So far, there is no case law providing guidelines for how to structure legally enforceable EDI transactions. To compensate for the fact that EDI transactions are paperless, some EDI users have negotiated written "trading partner agreements" to preauthorise the EDI transaction and set terms and conditions.

An important part of the trading partner agreement is specification of the liable party when something goes awry. However, apportioning liability—among trading partners, network service providers and software vendors—becomes more difficult as the transactions become more complex and the number of third parties increase. Under the provisions of negligence law, errors in business transactions must be fixed soon after they are discovered or the liability increases dramatically. Consequently, it is unwise to leave EDI systems running unattended.

3. Trading Relationships

EDI changes the relationships between organisations and their trading partners, by shifting the functions between suppliers and their customers to the advantage of the more powerful partner. Usually, this development proves beneficial to both parties (reduction in stocks, better control of distribution, improved production planning and control), but can also have the effect of reducing the presence of a supplier, which in turn reduces the number of sales opportunities available.

Whilst there are organisations (Marks & Spencer being a perfect example) that are in a position to impose their wishes on their trading partners, most companies need to educate their suppliers and sell them the benefits of EDI. This may be the most important component in the whole EDI implementation programme.

4. Management

Users are being required to adopt new ways of looking at information flows, to recognise the value of information and to acknowledge the competitive advantages EDI can provide.

Whilst EDI obviously entails more responsibility for the IS department, it can also provide management with the opportunity to introduce other organisational changes, because the adoption of EDI means a change in the way a company does business.

Most large organisations, in particular those with a range of EDI applications, have appointed a manager with specific responsibility for the introduction of EDI, its promotion within the organisation, the identification of priorities and the coordination of all EDI activities.

Any organisation considering EDI needs to prepare itself adequately. Major strategic applications have to be endorsed and advocated by senior management directly affected by the area of application. The "EDI manager" should be looking to create awareness about EDI, to establish priorities and allocate resources accordingly and most importantly, provide a focus of EDI expertise and support.

Where the introduction of EDI reduces the numbers of staff performing functions closely related to the handling of paper documents (i.e., data entry, telephone inquiry staff, post room staff), the issue needs to be handled carefully since there is a danger that lack of information and inadequate preparation can exacerbate the situation. Furthermore, in the early stages reductions in staff are not high, with only 17% of user respondents laying people off. Our user research also indicates however, that reaction to EDI implementations in Western Europe has been generally positive. These figures are illustrated in Exhibit V-8.

The technology must not be viewed as a solution in itself. Senior management must be prepared to advocate and administer organisational change. This change comprises changes to business and working practices, job functions, manning levels, organisational infrastructures and information flows.

INPUT believes that where office automation failed to fulfill the hype surrounding its introduction and failed to achieve a significant impact on an organisation's infrastructure, EDI—because it imports external influences and more crucially, because it cuts across internal functions and departments—is likely to have much greater success.

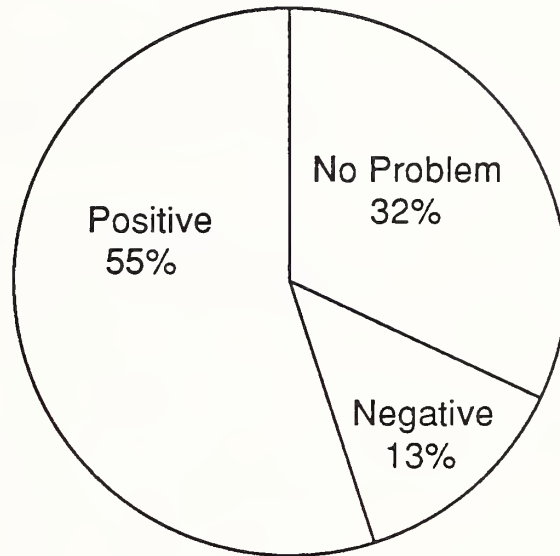
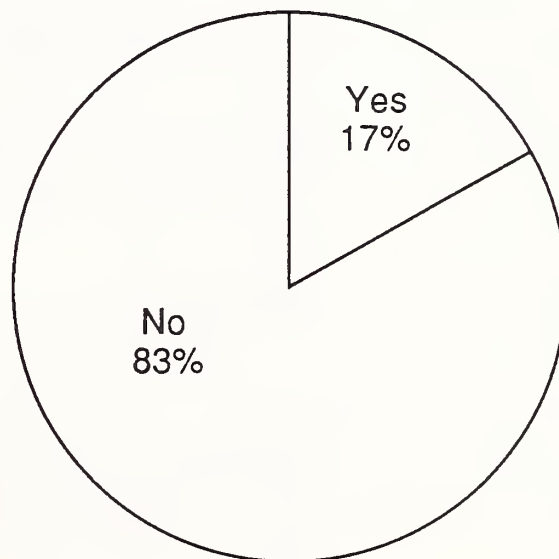
5. Pricing Trends

After standards, tariffs are the next most important area for attention. Although the European Commission is reluctant to comment on this subject area, it is undeniable that there are some massive discrepancies on national tariff structures within the Community.

The Commission's sensitivity is understandable since the tariff structures of the local PTTs often reflect their perceived role as a major provider within society generally. Thus, in West Germany, where the Bundespost's long-distance charges are notoriously high, this is accepted as a reasonable way of providing cheap local services to the general public and also of indirectly supporting the German postal system by cross subsidy from the DBP's monopoly revenues.

Similar situations exist in several other EC member states. Long-distance revenues at about ECU 15 billion to ECU 25 billion per annum still constitute an overly large proportion of the total telecommunication service revenues that are worth about ECU 62.5 billion a year.

EXHIBIT V-8

**EDI INTRODUCTION
(Western Europe)****Sales Department Reaction****Were Headcount Reductions Made
as a Result of EDI Introduction?**

Source: INPUT User Research

Although the Commission feels that these discrepancies threaten the even development of network services across Europe (which can be critically effected by relative leased line and public service costs), it also accepts that tariff reforms pose political issues at a national level that cannot be rushed or bypassed. It is generally accepted that tariffs will have to be somehow normalised, although it is still unclear how.

Probably, the main stumbling block is finding an accurate way of equating tariffs to costs. Network access and depreciation charges are necessarily different in different parts of the Community, because of varying operating conditions. For the moment, the Commission seems content to let individual PTTs reform tariffs under their own steam; there is evidence that in regions such as West Germany, where the DBP finally abolished its unpopular volume related charges for some categories of leased lines, local PTTs are willing to make their own reforms without risking intervention from Brussels.

If by 1992 this laissez-faire attitude has not produced the desired results however, the Community can resort to its bank of different legislative measures, and it would probably not be difficult to show that a local tariff structure was impeding the operation of the single market.

6. Interworking

Companies tend to predominantly use one network, a situation that is likely to hamper cross-industry EDI transfers since communications are generally limited to companies on the same service.

An alternative is to have multiple arrangements, but this requires maintaining several equipment and software settings to accommodate communications on different networks and, depending on volume, may also require multiple dedicated lines.

However, the third-party service providers are increasingly implementing agreements between themselves and have gateways to other domestic or international packet-switched networks.

- INS and Istel
- Istel and IBM
- Transpac and Infonet

These connections are needed for internetwork transfers and for the third-party service providers to offer a full service to customers. Furthermore, these interworking enhancements will provide considerable advantages to the third parties over private EDI systems, enabling them to differentiate their service.

C

Competitive Environment

1. Network Services

The network ("third-party") service providers offer EDI network management services, protocol/speed conversion, error correction, data validation, format translation and store-and-forward services. Western European service providers include large multinationals, such as GE Information Services (GEIS) and its joint venture with ICL, INS, IBM's Infor-

mation Network and various joint ventures throughout Europe, Axone in France, Intesa in Italy, Dannet in Denmark, and EDS, as well as European-based players such as GSI, Seres, Istel, and the PTT-linked organisations such as Transpac in France. Additionally, INPUT anticipates that the national PTTs will be offering EDI services within the next 12 months.

However, INPUT believes that the network services providers are currently best positioned to benefit from EDI growth for the following reasons:

- Their networks have a strong presence. As cost-effective communications links, the networks already serve many of the industries currently engaged in EDI.
- The third-party providers have mature, widely dispersed marketing organisations and are able to offer international capabilities either through European presence or through arrangements with foreign networks.
- Third-party networks' EDI services have been endorsed by industry associations, enabling them to capitalise on their product development leads.

The third-party providers will experience significant EDI growth up to 1994 as the earlier problems of lack of awareness and the high costs of implementation are no longer as significant. Nonetheless, due to the initial low volumes and high initial costs of education and sales, INPUT estimates that third-party EDI profitability will be reached by market entrants four to five years after service introduction.

Additionally, as a true pan-European market develops, more services will enter the EDI market, notably the PTTs and the banks. As a consequence, price competition will intensify. In the future, whilst a network infrastructure provides vendors with an opportunity to maximise margins, EDI alone will not justify the capital costs of network development. Even though network capacity can be leased (at least in the deregulated telecommunications environments), EDI in itself is insufficient to ensure profitability.

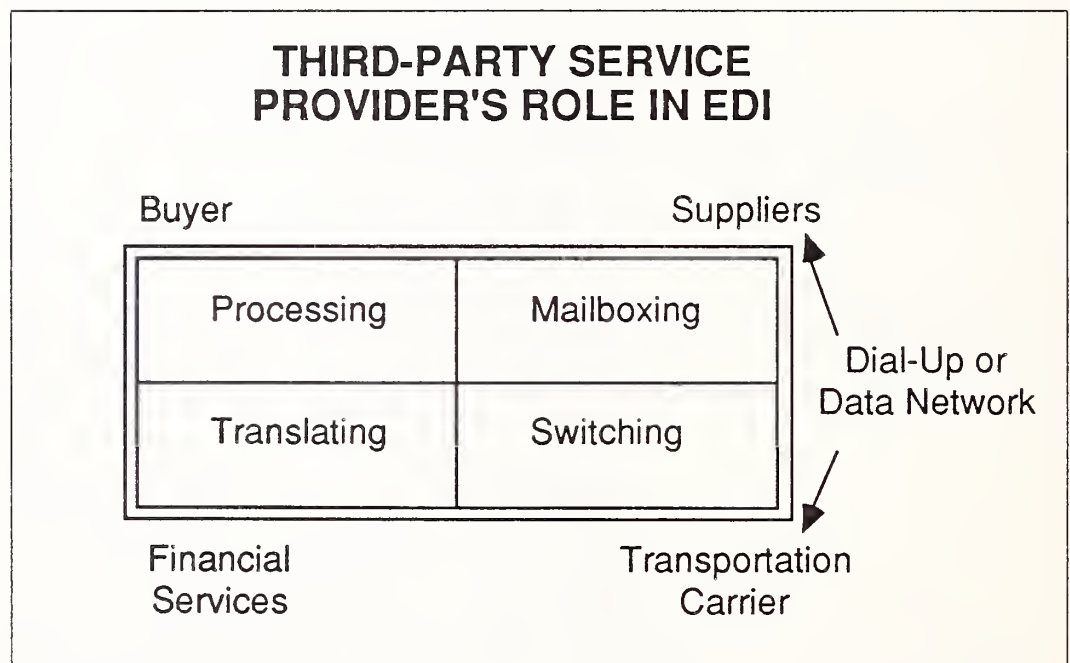
Service providers are having to deal with four critical issues:

- High overhead costs
- Technical research and market development
- Perceptions about service provider viability
- Lack of critical mass

Vendors need to be looking to increase transaction volumes by promoting EDI through its user base with training, technical support, newsletters, seminars and the development of user groups. Vendors should also be looking to develop their commercial relationships with software and turnkey vendors by forming marketing agreements; Istel in the U.K. has been notably active in this area, within and outside Europe.

With many organisations realising the significance of fully integrated EDI, network service providers have an ideal opportunity to benefit from their experience over the past three years. With organisations still tending to veer towards "one-stop shopping," a full-service offering will reap benefits in terms of developing customer base and customer loyalty. Services that are likely to be required in the near future will be a pan-European service including financial services, electronic mail and/or facsimile conversion as well as graphics in the manufacturing sectors (with CAD/CAM interfacing with EDI to enable design, specification and blueprint exchange between trading partners). The third-party service provider's role in EDI is summarised in Exhibit V-9.

EXHIBIT V-9



2. Software

At its lowest level, EDI software is a translator that converts data between internally used formats and those required by a trading partner, or between internal formats and agreed standard formats.

As the EDI market develops on a European and international scale, these formats are those that have been approved by a standards body such as EDIFACT in Europe, TRADACOMS in the U.K. and ANSI X12 in the U.S. A translator will convert data into an industry-specific format (i.e., Odette, in the automotive sector).

EDI software is addressing the multiplicity of communications protocols and user requirements in Western Europe by inclusion of an associated communications module that handles network links for data transmission and mailbox access through private or third-party networks. EDI gateways have been developed to support the many application systems within the user's organisation, enabling a clear upgrade path towards fully integrated EDI systems.

An EDI gateway assembles all of the separate software packages for the individual networks under the control of a high-level document router application in order to accept data from any of the applications and pass the data, via the appropriate application interface, to the target network, or to pass the data received from the various networks onto the correct application.

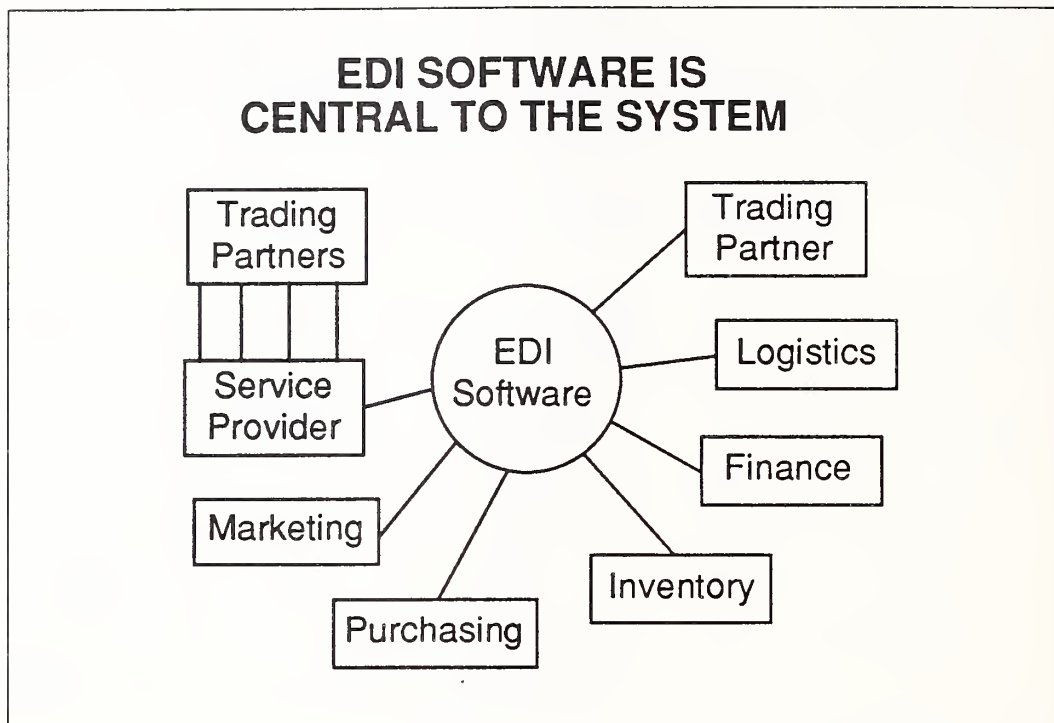
Until the arrival of Digital's VAX/EDI product, which includes an applications interface, EDI standards translator, communications component, user/supervisor interface and systems manager interface, none of the major computer manufacturers have offered their own EDI software.

The EDI network services providers have been selling other vendors' packages. In the U.K. the Interbridge package has proved successful for both INS and Istel, whilst in Europe software development has taken the form of project development. For example, the Allegro project in France, undertaken by Seres, which is a joint venture between Bull and Sesa is in project development.

The essential characteristic of the Western European software market at this early stage is that it remains small and fragmented. There are no clear market leaders, although SD-Scicon, GLI and Perwill are three software vendors that have demonstrated an impressive understanding of market requirements. The crucial importance of EDI software is illustrated in Exhibit V-10.

The EDI software market will benefit from the establishment of commercial agreements between service providers and software firms, with the objective of integrating EDI into other applications. In additions, the continuing presence of software vendors on standards-making bodies and EDI associations helps to ensure that the process of migration from industry-specific or national standards to EDIFACT is carried out by upgrading current users without "reinventing the wheel."

EXHIBIT V-10



3. Professional Services

In Western Europe, a trend in the development of EDI is that many users will need professional services to customise EDI software and integrate systems. External assistance is bound to be needed due to the applications backlog at many user locations.

As a result, although end-user expenditures for EDI professional services only form a small part of the overall EDI market in 1989, INPUT anticipates that the market for EDI-related professional services will grow at a compound annual growth rate in excess of 40% amidst the approaching single European market, due principally to the growth in EDI-related software development, consultancy and education and training.

Software development, which constitutes the largest market segment, includes: user requirements definition, systems design, database design, programming, testing and debugging, system modification, system customisation, documentation and procedures. The key activity currently is the development of applications interfaces between EDI translation software and existing business applications.

The consultancy category includes software installation planning, computer systems audit, security audit as well as personnel issues.

Education and training relates to the whole range of training required, from analyst/programmer to management levels. Although this segment is the smallest of the three, its importance cannot be underestimated since it provides vendors with access to user management and an opportunity

to highlight the overall value of EDI as an integral part of an organisation's systems infrastructure.

Users are looking to optimise the benefits of EDI by extending the application across multiple department lines. Already in Western Europe, companies such as Seres and GSI in France and GLI in Germany are taking responsibility for developing the system from project design to implementation, coordinating the three key strands - computing, telecommunications and software.

There will be increasing difficulty, as the West European EDI market develops, in clearly defining what constitutes an "EDI professional services project" as EDI implementations lead to further end-user expenditures in areas directly, or indirectly, linked to EDI.

This will occur in the area of "advanced productivity," where vendors are required to carry out follow-on work to integrate systems with EDI functionality throughout an organisation. These systems will result in clear operational efficiencies and higher productivity.

Exhibit V-11 lists the type of companies that INPUT anticipates will be providing EDI-related professional services.

EXHIBIT V-11**THE WESTERN EUROPEAN EDI
PROFESSIONAL SERVICES MARKET**

- Network service providers
- Computer equipment manufacturers
- Software firms
- Professional service firms
- "Big 8"
- Independent consultancies
- Trade association
- Industry groups
- Banks

Currently, the network service providers, computer equipment manufacturers and software firms are offering EDI professional services. As a pan-European network and standards infrastructure unfolds, the market

for professional services will expand and fragment as multinational and national organisations seek to position themselves by rapidly incorporating the new technologies and techniques associated with EDI. For this reason, the professional services firms, the independent consulting firms, the "Big 8" accounting firms and the banks will take a more significant role.

As critical mass builds in Western Europe, a professional services project will constitute the following key elements:

- Conduct a cost/benefit analysis, prepare an EDI-project proposal and implementation plan
- Evaluate and recommend delivery modes
- Develop and implement education and training programmes for the "EDI community" that should be extended beyond the user organisation itself and structured to incorporate trading partners
- Interface EDI software to business applications and upgrade related applications

With many EDI projects in Western Europe still in the pilot or testing phase, the opportunity for professional services firms that are not currently providing network or software services is still relatively small. The process of dynamic change throughout Western Europe in the next two years will inevitably result in a user need for the professional services outlined above. A quality product and an effective marketing strategy will result in substantial contracts.

4. Partnering

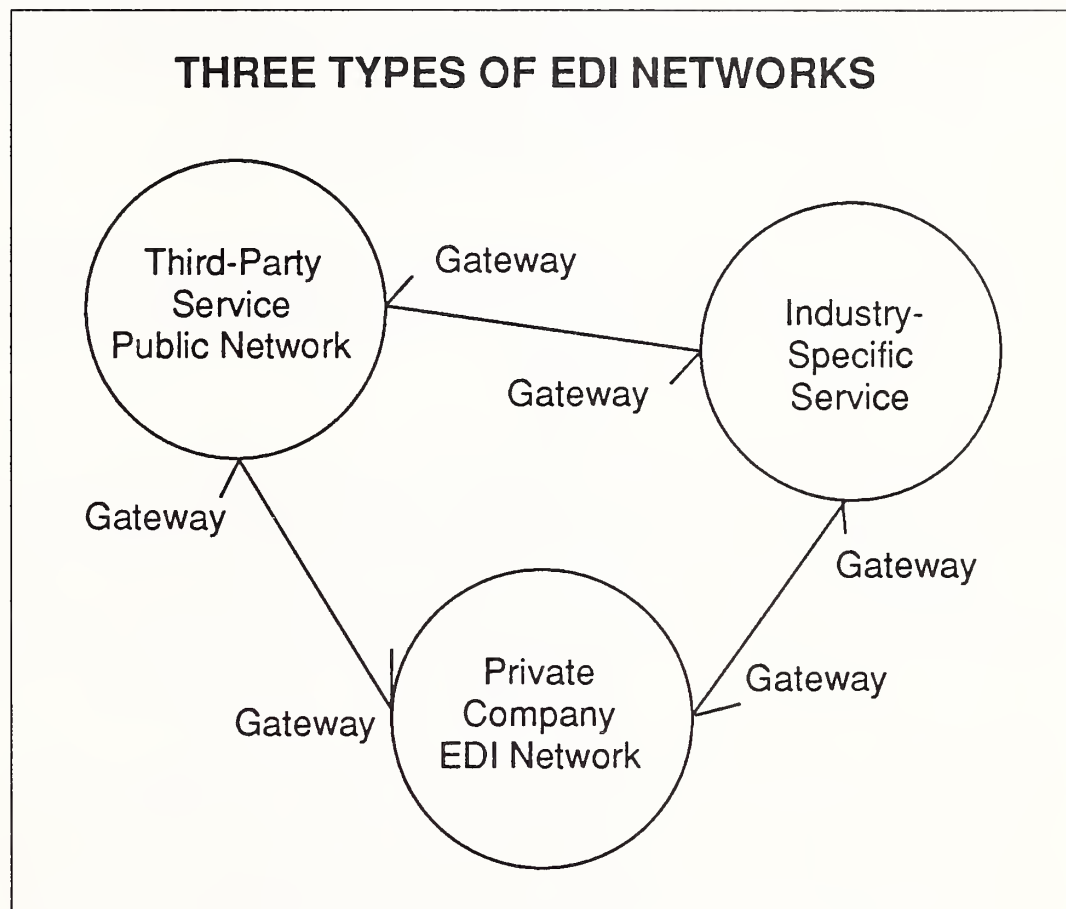
INPUT believes that despite the problems still to be overcome, pan-European or international EDI is an opportunity and a requirement for companies serious about offering EDI services on a third-party basis.

First, large accounts (multinational corporations) will require international EDI. Second, the ability to offer international EDI reflects the service provider's position and image in the market. A full-service EDI provider will be expected to have international services, even though the smaller accounts will not need those services.

Third-party service providers will normally require a variety of partners to facilitate and optimise an international EDI service. For example, Europe's sleeping giants, the banks, particularly those with trading partner subsidiaries, often have in place networks, and have developed financial management products useful to international trading.

Bank networks supporting international needs can often be made available at a marginal cost to other corporations, whilst the banks' expertise in technical services may be available to build networks in regions currently unserved. The different types of EDI networks currently in existence are illustrated in Exhibit V-12.

EXHIBIT V-12



Other partnering options may be found among the "Big Eight" accounting firms, which are developing accounting and information management systems for multinational trading firms.

Software vendors selling packages to international trading customers can bring active customer lists and application-specific expertise to a partnering relationship.

Large multinational corporations will naturally be the prime targets for international EDI services, but they may also serve as codevelopers of such services. Large multinationals often have internal expertise that may be leveraged in broader markets and may consider migrating their private network implementations to public services as international EDI availability, usage and acceptance grows.

EDI software vendors, in particular, should be looking to develop alliances with computer vendors to develop turnkey systems for smaller users and for industry sectors with specific requirements. Additionally,

software vendors will benefit from strategic partnerships in areas where a pooling of resources leads to a strong development, marketing and support organisation.

Partnering opportunities may be found with networks not currently offering EDI; the obvious example are the PTTs, who will be offering EDI services in the near future and may represent a threat, by virtue of their size, to current players.

5. The Role of Banks

At the generic level of EDI, banks have been involved for a long time in areas such as electronic funds transfer and clearing—the Society for Worldwide Interbank Financial Telecommunications (SWIFT) is an example.

The key current issue for the banks is how to extend from interbank message transfers to the electronic transfer of all trading data between each other and their customers. All past examples of generic EDI have taken place within closed user groups, each setting their own standards of message format and communications protocols. The main focus now is on developing inter-sectoral and international links in a cobweb fashion. Thus, banks will have to accommodate links with their corporate clients if EDI is to progress in a structured way.

In Europe, there is a finance group within the EDIFACT organisational structure, that provides a forum within which banking standards can actually be viewed and endorsed within the EDIFACT organisation. There is also the EDI Association that operates as a user group through which ideas and requests can be channelled. Within the finance group, and with a secretariat provided by SWIFT, a subgroup has been established to conduct data flow analysis, investigating the use of EDIFACT standards for banking messages. SWIFT is also working with the U.S. ANSI and EDIFACT groups to create a form of EDI banking coordination worldwide.

However, banks' focus has been almost exclusively on the internal operations of the banks themselves and the related inter-bank transactions. SWIFT standards have not been primarily concerned with the transmission of data between banks and their customers. SWIFT standards have therefore tended to differ greatly from the evolving EDI standards in terms of format and content. However, the commercial aspects of a transaction are an intrinsic part of the financial and credit aspects of the same transaction. The shipment of goods between two trading partners must always be accompanied with a payment for goods.

Because EDI standards have grown separately in the banking and commercial sector, specific problems have developed with payment transactions. Missing links in the payment cycle can quickly arise. There is an

emerging need for banks to understand how their information requirements interlink with that of their customers for both clean funds transfer and for transfers associated with documentary credits.

It is surprising given the banks' lead in the field of intra-sector EDI (i.e., Chaps and BACs) that they have failed to take the next step of standardising their links with their customers. The danger for the banks is that if they take the initiative and develop products in the wrong format and fashion, they may experience failure similar to that experienced by several U.S. banks attempting to develop treasury workstations.

Increased competition will force the banks to take on EDI standards. If banks succeed in terms of standards and delivery channels, the banking function will play a key role in the EDI chain by 1990.

6. PTTs

The PTTs, with the advantage of existing customers and ownership of the basic network, are also preparing for the EDI challenge. The Pan-European MDNS (Managed Data Network Service) will expect EDI to provide the core business. The aim of the MDNS is to help multinational companies and other international organisations meet their demands for cross-border network development.

MDNS is looking at a number of private-service providers to help meet the July 1989 schedule for starting up its network. Infonet had made an offer to CEPT's Commercial Action Committee to provide the physical network support for its MDNS project. But the European Commission is investigating whether the participation of some of the same administrations in Infonet and MDNS violates the Community's competition policy.

For example, there is Scandinavian Telecommunications Services (STS), a joint venture company that has been set up by the PTTs of Sweden, Norway, Finland and Denmark, whilst the French, West German, Spanish and Belgian PTTs have bought stakes in Infonet. In addition to this, France Telecom and the Deutsche Bundespost agreed to link their videotex services.

The start-up of the 22 PTT MDNS, formally inaugurated in February 1989 under Dutch law, known as Mitos NV, has been delayed until September 1989. Products will include: support for access to X.400, FTAM (File Transfer Access and Management), connectivity to a range of IBM protocols including 3270, SNA, 2780 and 3780. Support for individual customer protocol needs a set of network management tools spanning network configuration and monitoring. A help desk plus single-sourced accounting and billing services. Gateways enabling users to access public switched telecomms services. Initial gateway provision is planned for any OSI or SNA private network, public packet and circuit switched networks and teletex.

However, it is not clear how MDNS will deliver these services. An umbrella network built on a common implementation of X25 will be implemented spanning all member countries, linking into each national packet-switched network via-powerful protocol conversion.

Some PTTs may follow the lead of British Telecom and Mercury. These companies have already stated that neither will actively market MDNS products because they intend to offer their own international services soon.

Some users have taken matters into their own hands. In Norway, 50 private sector companies involved in exports have joined forces with the PTT to set up a venture called Norvans to provide customers with network managed data pipes, plus additional applications such as X.400 and EDI. Links to London, the U.S., Tokyo, Australia and Singapore are envisaged.

D

Country Markets

1. Overview

Although Southern Europe is increasingly seen as the region most likely to provide the most dynamic growth over the next decade, the heart of the European economy still lies in the traditional areas: France, West Germany, the U.K. and Benelux. Not surprisingly, it is in these areas that the preparations for the integrated market in telecommunications has been most advanced.

In the U.K., the Government, following the U.S. example, started to liberalise service provision in the early 1980s by privatising British Telecom and introducing competition in the form of Mercury. A host of other players including IBM, GEIS, CSC and EDS were attracted by the rewritten rules and the promise of profitable investment as traffic was diverted from the national networks onto their own systems.

The privatisation of British Telecom also introduced into the world market a new global player, roughly equal in size to the 11 regional telecommunications operators that resulted from the break-up of AT&T. Like those regional operators (RBOCs), some of whom are gradually entering the European market, British Telecom intends to shift the emphasis of its activities from its traditional home base to international markets.

British Telecom, apart from the Spanish Telefonica, is the only privately owned national European operator. It can expect stiff competition from the French, the West Germans and the Dutch.

The stages of development of EDI vary markedly from one country to another. The key factor underlying these differences between countries

is the extent of deregulation of the telecommunications market. Most of the EDI communications in mainland Europe have been done via-direct links between trading partners rather than adopting the clearinghouse approach adopted by the U.K.

France's network is now the most modern on the continent, following a programme of extensive introduction of digital switching and transmission techniques. France Telecom predicts that by the end of 1989 75% of trunk exchanges will be fully digital.

Data users also have access to what is claimed to be the world's largest packet-switching service, Transpac, which handles 40,000 direct connections and transmits some 1,000 billion characters a month. The French legislation gives ministers the power to add a 30% surcharge on lines leased for value-added services. In addition, specific ministerial permission will be needed to operate services on lines with a capacity greater than 3.5 or 5 Mbytes per second for limited (industry-specific) or general networks, respectively. Also, the lines cannot carry voice traffic and the value-added portion must be greater than 85% of the final charge—a maximum of 15% is allowed for the basic transport costs.

Services such as protocol conversion, a staple of the private suppliers, is not permitted because it is considered a basic telecommunications function. Neither are managed data network services—unlike in the U.K. where U.S.-owned service providers such as GEIS have been encouraged to operate.

France Telecom and British Telecom will be competing for status as a hubbing (or switching) point for traffic into and out of Europe. This role is viewed as a lucrative opportunity by all the European PTTs. Private suppliers threaten to skim a substantial portion of the revenues of the PTTs; to counter this, the proposed MDNS has emerged.

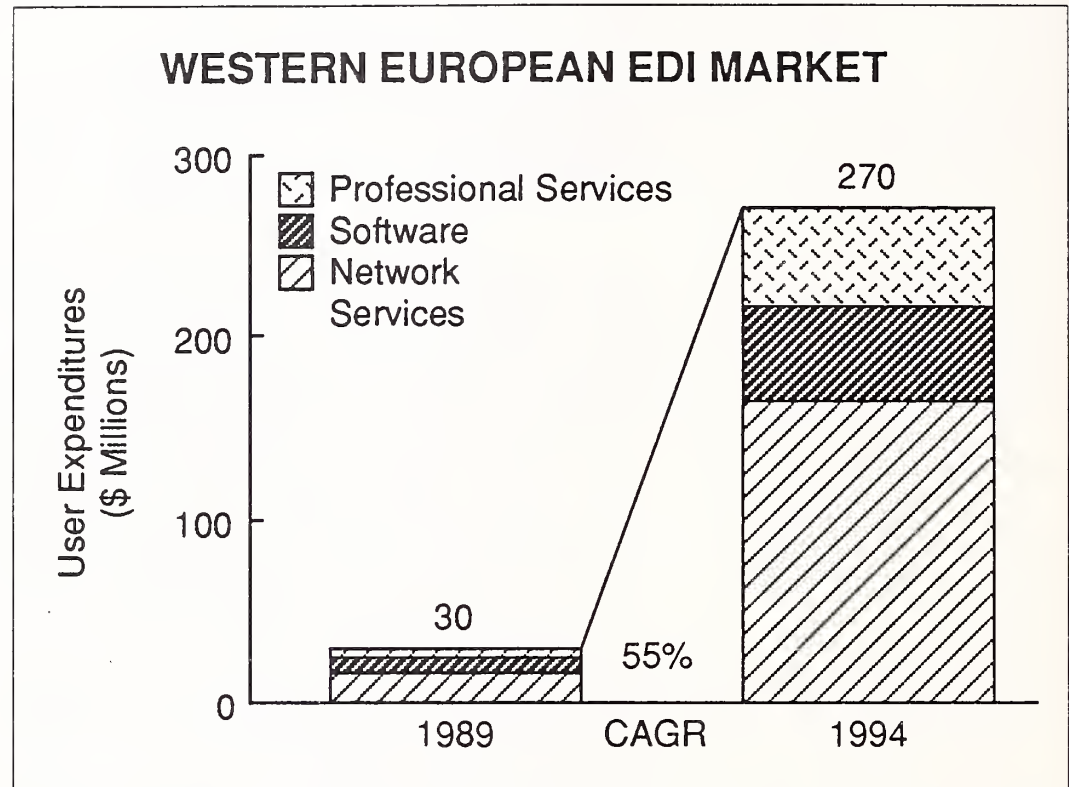
The U.K. is the most mature European market in terms of third-party services. INPUT estimates that there are approximately 3,000 users of European EDI services, with 65% of users in the U.K.

Projects are using the first implementation of the international EDIFACT standard, which will be harmonised with the U.S. ANSI X12 standard. The European Commission is sponsoring several EDI projects, including COST 306 for the transportation sector and the CD project in the customs area.

The 1989 EDI market in Western Europe is expected to be worth \$30 million and is expected to grow at a compound annual growth rate of 55% to reach a \$270 million market by 1994. The EDI market comprises third-party network services, software and professional services as shown in Exhibit V-13. The exhibit highlights the market domination of the

network services sector in 1989, but decreasing by 1994 as critical mass rises and costs drop, with the software and professional services showing a marked increase.

EXHIBIT V-13



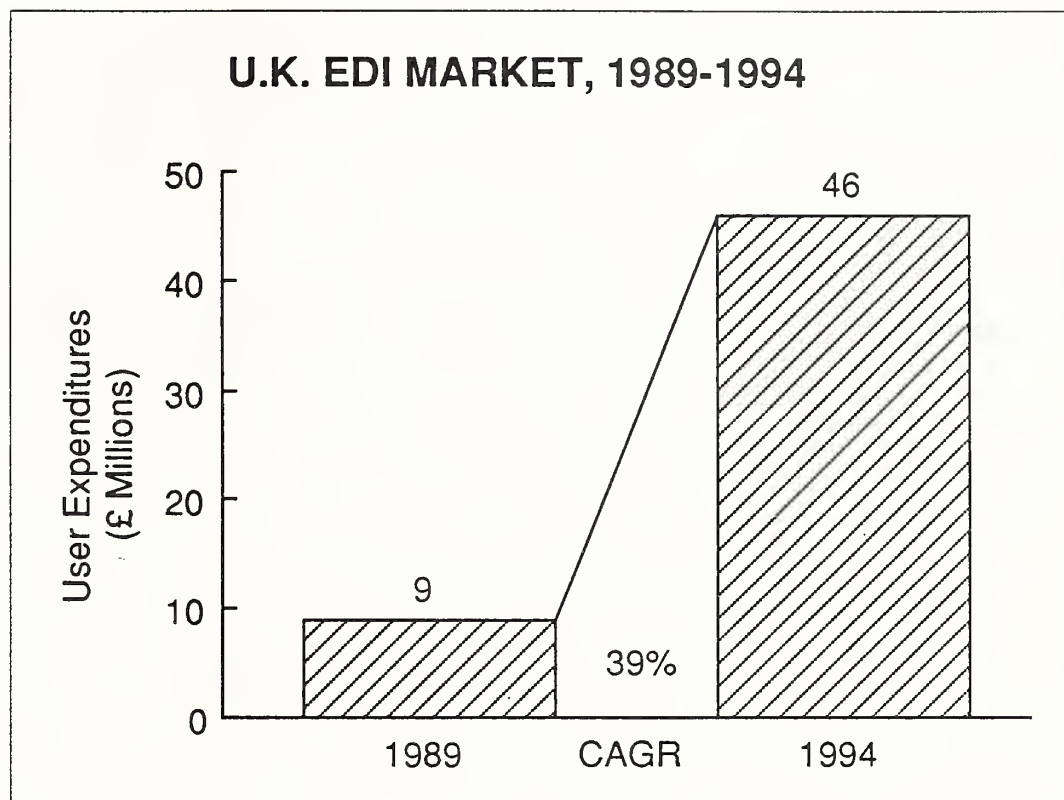
EDI's strategic importance is reflected in the very high levels of interest and commitment to its development by government bodies and commercial associations representing a broad industry cross-section. The European Commission has sponsored the TEDIS (Trade Electronic Data Interchange Systems) programme to promote a standardised approach to EDI by all potential industry and government users as well as examining legal, technical and implementation issues.

2. United Kingdom

a. Market Size

The largest individual country market for EDI software and services is the U.K. with currently over 50% of the total Western European market. The estimated size and growth of the U.K. market is shown in Exhibit V-14. The market will reach over £9 million by the end of 1989, it is expected to grow at a slower rate than the rest of Europe due to the advanced nature of EDI within the large U.K. companies. Nonetheless, by 1994 the U.K. market will be worth £46 million, still representing a large percentage of the Western European total.

EXHIBIT V-14



Leading EDI software and services vendors are included as Exhibit V-15.

The process of telecommunications liberalisation in the U.K. has promoted the development of EDI services, with the U.K. becoming important for international EDI by serving as a principal hub and gateway for data between Western Europe and the U.S. The U.K. EDI market has been fostered by telecommunications liberalisation and the rapid development of EDI standards for a broad cross-section of industries, using the TRADACOMS standard.

The majority of U.K. users are linked with the Article Numbering Association's (ANA) retail and distribution initiative. The ANA played a large part in the U.K.'s early adoption of EDI. In its principle role of administering the international numbering and barcoding initiative, it was responsible for putting together its own standard for EDI, called TRADACOMS, which is now used by more than 1500 firms in the U.K. Traffic on the U.K.'s networks is growing at 20% per month.

EXHIBIT V-15

LEADING EDI SOFTWARE AND SERVICES VENDORS, 1989 U.K.

Rank	Vendor	1989 Revenues (£ Millions)	Market Share (Percent)
1	INS	5.1	55
2	Istel	2.1	23
3	SD-Scicon	0.8	9
4	IBM	0.5	6
5	EDS	0.2	2
6	Digital	0.1	1
7	Perwill	0.1	1
8	Hewlett-Packard	0.1	1
9	Price Waterhouse	0.1	1
10	ESL	0.1	1
	Others	0.1	1
	Total Market	9.3	100

b. Network Services

There are three major network service providers offering EDI network services within the U.K.:

- INS
- Istel
- IBM

International Network Services (INS) is a joint venture between GEIS and ICL. It was formed in 1987. INS offers several EDI services:

- Tradanet (commercial), endorsed by the Article Numbering Association (ANA), uses the ANA's TRADACOMS standard, ODETTE and EDIFACT, with OSI standards implemented within the network. It is the U.K.'s leading EDI service, providing store-and-forward service in over 20 market areas such as food, clothing, chemicals, mail order, stores, pharmaceutical, white goods, electronics, public utilities and authorities, distribution, DIY, brewing, leisure, oil and petroleum, opticians, music, fast food and publishing. Nine of the top ten retailers in the U.K. and 50 of the *Times* Top 100 companies subscribe to the service. At least 600 Tradanet users are expected to subscribe in 1989.

There are over 70 different types of computer equipment and software connected to Tradanet, which is linked to GEIS's EDI*Express as well as to INS services, Motornet and Pharmnet. The interconnection is a full application-to-application bridge, requiring no specialist equipment or software since the bridge is transparent to the end user. Participating industry and trade associations include: ANA, SMMT, AMDEA, ECIF, AFDEC, DISH and EDICON.

- Motornet (automotive manufacturers, suppliers, customs, agencies and shippers) was created by GEIS in conjunction with the Society of Motor Manufacturers and Traders (SMMT) and the Organisation for Data Exchange by Teletransmission in Europe (ODETTE). Motornet provides a commercial document exchange for the automotive industry, primarily in the U.K., but also internationally. Main documents carried are invoices, schedule releases and advice notes, using the ODETTE formats. Motornet is linked to GEIS's worldwide EDI*Express service as well as being interconnected with Tradanet and Pharmnet.
- Pharmnet (pharmaceuticals) provides a service for Regional Health Authorities, wholesalers, suppliers and pharmaceutical companies to transfer documents electronically; similar to Tradanet and Motornet, Pharmnet is linked to GEIS's worldwide EDI*Express service. Eight of the world's top ten pharmaceuticals operating in the U.K. are subscribers to Pharmnet and 60% of the ABPI (Association of British Pharmaceutical Industry) are contracted to the service with the remainder expected to join later in 1989. Six of the 15 Regional Health Authorities (RHAs) in the U.K. are also using the service; All of the RHAs are expected to join the service in 1989 following the recent National Health Service initiative that recommended the use of EDI and the endorsement of INS to provide EDI services to all of the RHAs for pharmaceutical and general supplies.

INS also offers Brokernet, a leasing-EDI service for Motor and General Insurance business, offering a facility to brokers, insurance companies

and syndicates to revolutionise the communications of the insurance world. Brokernet links the computers of insurance companies, syndicates and service providers not only to each other but to intermediaries, irrespective of location. Brokernet enables companies to avoid dealing with the technical intricacies of different internal systems and uses a simple standard set of instructions to do business. Brokernet standards are based on TRADACOMS; Brokernet also supports EDIFACT.

The INS service extends to some 60 U.K. underwriters including all of the major composites that market their product through high-street brokers, and the entire membership of the Lloyd's Motor Underwriters Association numbering 35 syndicates. Major chain brokers such as the AA, the largest motor broker in Europe and nine of the top 10 system suppliers to the high-street broker market support Brokernet through the Brokernet Executive Committee, a council formed to promote and develop INS-EDI services to the industry.

INS has expanded its service internationally through GEIS's-US-based EDI*Express, making it the world's largest EDI community, and last year launched the Tradanet International service. INS offers an application-to-application link with full accountability, audit control and security across a gateway, benefitting groups like CEFIC and EDIFICE that are exchanging invoices, orders and shipping documents in preparation for the liberalisation of Customs barriers in 1992.

INS has capitalised on its four-year investment in the international trade and transportation business. INS is active and represented in all of the subgroups of the U.K. EDI Association; it has developed its EDIFACT expertise and provides standards consultancy to its customers. As a result, INS has developed the Equator software package for exporters, freight forwarders, liner agents and carriers.

INS has also made inroads into the lucrative market provided by the convergence of EDI and EFT with a contract with the U.K. banks' cheque clearing service, BACS, for an electronic funds transfer trial, and BACSNET, which will enable INS users to transfer the classic EDI documents—orders, invoices and picking lists as well as transmittal of payments and direct debits to BACS. INS has run an International Trade Payments pilot with National Westminster bank and has as a consequence established links with all of the major participants in the International Trade cycle, thereby closing the loop between shipper and consignee.

Istel, one of the largest European professional services companies, has built on its strong base in manufacturing by offering EDICT, a general-purpose EDI service that supports various standards. The most widely-known of Istel's services is EDICT for the automotive industry that runs against INS's Motornet. This is a key market since the major suppliers to the automotive industry also supply many other sectors.

EDICT's customer base evolved by following trading links in the economy, first with the backing of Austin Rover and later with the ODETTE endorsement, and promoting the service within the automotive manufacturing community. Due to the overlap between industries, a much wider range of companies was then attracted to the service—from aerospace to mining and chemicals. This initially successful engineering and manufacturing sector now accounts for 70% of EDICT customers, providing the crucial and vital "critical mass" for successful operation. This has led to sectors whose suppliers trade on the periphery of the engineering and manufacturing industry to realise the benefits of EDI.

In 1989 EDICT is a multisector EDI service with customers in engineering, manufacturing, distribution, health, travel as well as the financial sectors. EDICT is very flexible in terms of data formats and can handle document layouts such as UNGTDI, TRADACOMS, ODETTE, ANSI X12, VDA and EDIFACT.

There are over 40 different types of computers connected to the EDICT service, with one-third consisting of micros. Additionally, Istel has a range of software tools that can aid users coming onto the service. These range from a basic receive and print module to full-blown application interface.

The Istel network is connected to a number of networks both in the U.K. and throughout the world. EDICT has customers in the U.S., Japan, Western Europe and Eastern Europe. Customers access the service through a variety of networks, using a variety of access methods. Istel has devoted considerable resources to the whole area of international EDI.

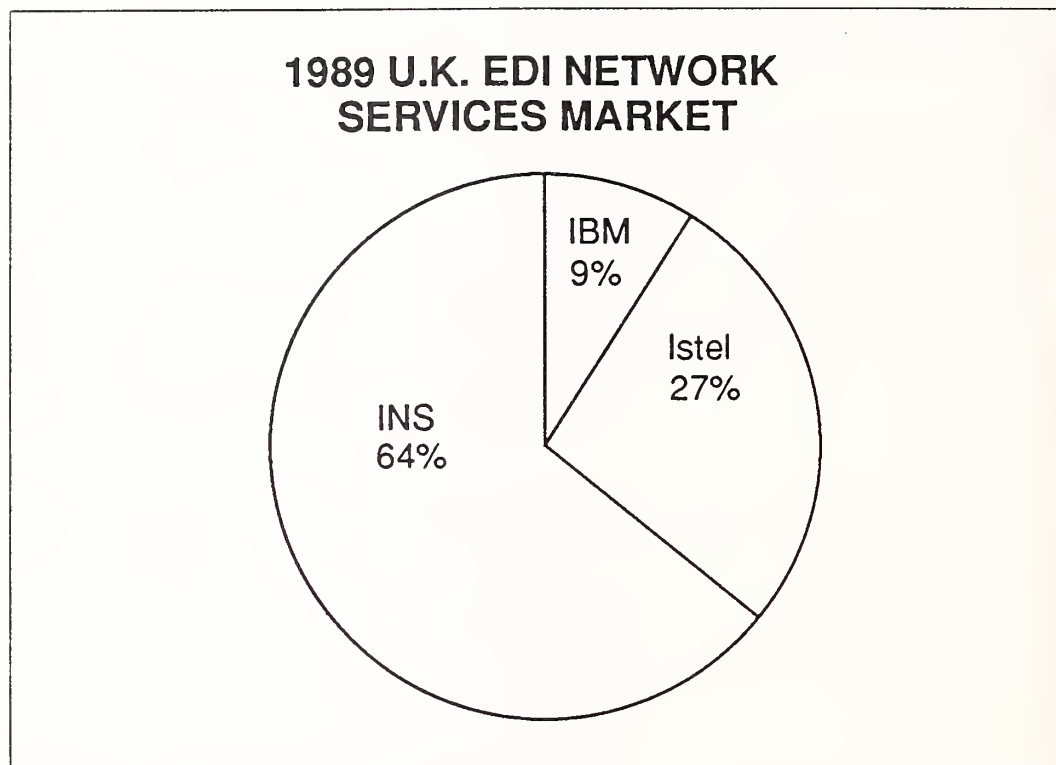
IBM, with its Information Exchange product, stresses the connectivity through its international network service. IBM believes strongly that users do not need to own or run their own networks and offers supplier accountability with its Managed Network Service by positioning the service as a "utility" and making the network transparent.

IBM's penetration of the U.K. EDI market has been uneven and disappointing. The company's two key contracts have been the development of a network and a wide range of services for the London Insurance Market and the contract for RINET, which has since fallen into difficulties. The RINET project was set up in 1988 by eight of the leading players in the European reinsurance market, with Mercantile and General Reinsurance as the U.K. representative.

As Exhibit V-16 shows, INS holds over 60% of the EDI network services market; Istel has almost a one-third; and IBM still has less than a 10% market share. INS has 1500 contracted subscribers and another 400 in the rest of the world that can be accessed via GEIS's international net-

work. INS points to a growth rate of over 100% per year as an indication of the growing importance of EDI. It is no longer a technology, but a business. About 800,000 documents are sent over the network each month with the volume doubling every six months.

EXHIBIT V-16



Istel has 850 users, with its largest customer base being, as expected, in the automotive sector. However, the link between Istel and IBM (no link exists between INS and IBM) provides both companies with opportunities to increase their user base. For IBM the advantage is that customers using EDICT and IBM's EDI offering, Information Exchange, will be able to access both services over a single-network connection. The benefit for Istel is that IBM's network will serve as the international glue for EDICT, a store-and-forward EDI service that can handle different formats in various business sectors and translate among them.

INPUT feels that interconnection and interworking between networks is critical for the EDI market to develop; vendors should regard the network as a commodity, with the differentiator being able to guarantee and provide local support.

There are other potential network service providers in the U.K. who are still positioning themselves with regard to the niche they perceive for themselves in the EDI market.

For example, Midland Bank relaunched its internal telecommunications network in April to take advantage of the planned liberalisation of private telecommunications networks. Midland already sells data transmis-

sion services, on its own network to third parties, principally its own corporate customers and travel agents, and claims to operate the largest packet-switching network in the country after British Telecom. Such a move would enable the Midland Group to compete with British Telecom and other U.K. network service providers in offering EDI and other specialised services because of its large base of corporate customers to which it is already offering cash management and payroll services.

British Telecom, through Dialcom, is establishing intelligent network links to provide the backbone of its worldwide infrastructure and intends to offer EDI services in addition to its existing E-mail, messaging and information services and X.400 software. British Telecom has been testing its newly developed EDI system internally since May 1988 and hopes to reach a larger EDI audience by offering both X25 packet switching and X.400 message handling as EDI transport mechanisms. EDI users will be able to send messages over British Telecom's worldwide Dialcom X25 network to other Dialcom subscribers in the U.K. and abroad.

c. Software

The EDI software market is a fast-growing, dynamic one, linking service provider, trading partner and an organisation's internal systems. EDI software is central to the installation and provides a challenge both for software companies and professional services companies.

SD-Scicon is the leader in EDI software development offering both products and services from its EDI "Centre of Excellence." The company has structured its EDI work into four distinct areas. This approach is being adopted by a range of software companies throughout Western Europe.

The four main areas are:

- Consultancy
- Turnkey implementation
- Product development
- Support

SD-Scicon also distributes the Interbridge data translation software and implements it in two packages of its own design, the PC-based EDI Workstation and the EDI Message Handler. Interbridge is a computer software package designed to provide assistance to companies implementing EDI. Developed by Sitpro, Interbridge is a powerful and flexible EDI formatting and deformatting translator that bridges the gap between in-house data, drawn from the company's information system, and the accepted industry standard formats. Using a table and parameter-driven approach, the software insulates the corporate system from the

complexities of the standard and ensures that new or amended EDI messages can be implemented with maximum efficiency.

Interbridge has an installed user base of over 1,000 organisations worldwide and has been endorsed by most of the leading computer manufacturers as well as trade and industry associations. Other distributors of Interbridge software are ESL Computer Services and The Software Connection.

SD-Scicon has also been responsible for the development of a number of EDI message management products and communications interfaces, such as the X25 Odette File Transfer Protocol Interface.

SD-Scicon has developed products for the network service providers (e.g., Intercept, an EDI workstation package for INS and EDIlink, an interfacing software package for PC and MVS environments for IBM).

Of the other software companies, Digital launched a fully integrated software product called VAX/EDI in 1988 that provides a complete EDI capability to exchange data over networks or via direct communications. The VAX/EDI product automatically transfers data to and from an application programme via a trading partner's mailbox on a network and can also transfer or receive data directly accessing the partner's application over a leased line.

Digital refers to the product as "Second-Generation EDI," because of the VAX/EDI's capability of linking mainframes and minis to multiple networks using multiple EDI standards and a variety of communications protocols.

Another company achieving success in the development and provision of EDI software is the Perwill Group. Hewlett-Packard is one of the major computer manufacturers that has chosen Perwill's EDIFORM/3000 and EDIPARSE/3000 solutions for its EDI trading requirements. Other users of Perwill software include Shell and ITT Canon.

Perwill's EDI/3000 product family presents a single set of software that facilitates trading using ANSI X12 and EDIFACT standards and readily allows connectivity to multiple networks.

Istel will supply EDI software and services to EDS for its major EDI network in Europe to communicate between General Motors and its suppliers.

Istel's EDICT software will be used to act as a central hub for GM's EDI traffic throughout Europe at a number of EDS's Information Processing Centres to control the flow of information, translate data formats and communicate with GM suppliers based in the U.K. It will be managed from Istel's Communications and Data Centre in the U.K.

Istel already has over 70 Vauxhall suppliers using its EDICT service whilst EDS has hooked up some 300 European suppliers to EDSnet in its own right. Istel's EDICT software, to be installed at EDS's five European data centres will manage information flow and message translation. Users will have a range of connection options, depending on their location, and suppliers connected to the Istel, Transpac and GEIS networks will not have to re-sign with EDS and the transaction costs will not be changed despite the extended service.

IBM (U.K.) launched EDI software for MVS in the first quarter of 1989. The Data Interchange software provides users with a set of tools to create form-fill screen images for documents to be translated into EDI formats. These formats specify how to identify different types of items in a structured business document. IBM's software supports EDIFACT as well as ODETTE. The product will be available for mid-range systems (System 36, System 38 and AS400) and the PS2 by the end of the year.

The Odette development of cheap PC-based EDI software packages (for creating, sending, receiving and printing any EDI message conforming to Odette standards), sponsored by leading suppliers to the automotive industry such as Lucas and Unipart is enabling small- and medium-sized businesses without systems support to implement EDI using the EDICT and Tradanet networks.

It is expected that some of the larger manufacturers will use packages such as these to develop specially tailored plug-in PC boards, which could be offered at no charge to their preferred supplier, for example, who would then be able to connect directly into an EDI network without the difficulties in systems development. Ford has already found considerable success in persuading many of its suppliers to use Fordnet, its corporate EDI network, by offering free EDI software and free message transmission. This is a trend that is likely to continue as the U.K. EDI sector expands.

d. Professional Services

Professional services may prove to be the most demanding sector of the EDI market. The requirements include not only expertise in a "leading edge" technology, but also expertise in strategic consultancy and project management.

SD-Scicon is currently supporting a user base of almost 500 customers, including many of the U.K.'s top 100 companies, as well as companies in Western Europe. Its consultancy activities are structured to assist organisations by advising on the standards and messages to use, assisting in the development of specifications and implementation plans and recommendation of the most suitable hardware and communications equipment.

SD-Scicon is also currently involved in the provision of software and assistance to the various EDI pilots and industry association initiatives currently being held throughout Western Europe.

Sitpro has played a major role in the development of the EDIFACT standard and has recently launched the "EDIFACT Service," a publication by the EDI Standards section of Sitpro. The EDIFACT Service is designed to give information, advice and guidance to companies undertaking the introduction of EDI using EDIFACT standards.

IBM and Texas Instruments are jointly promoting EDI by educating suppliers with seminars and easy-to-read user guides. IBM's goal is to have 50% of European business conducted by EDI by 1992. At present, 50 suppliers have joined IBM's commercial network and communicate by E-mail as a first step towards implementing EDI.

The Tradanet User Group was set up in June 1988 in order to provide a forum for the exchange of ideas and experiences and a single communications channel to relay business needs to INS and the ANA. The prime objectives of the group are to recommend future developments and to act as a liaison with industry groups and EDI bodies, both internationally and nationally.

e. Vertical Sectors

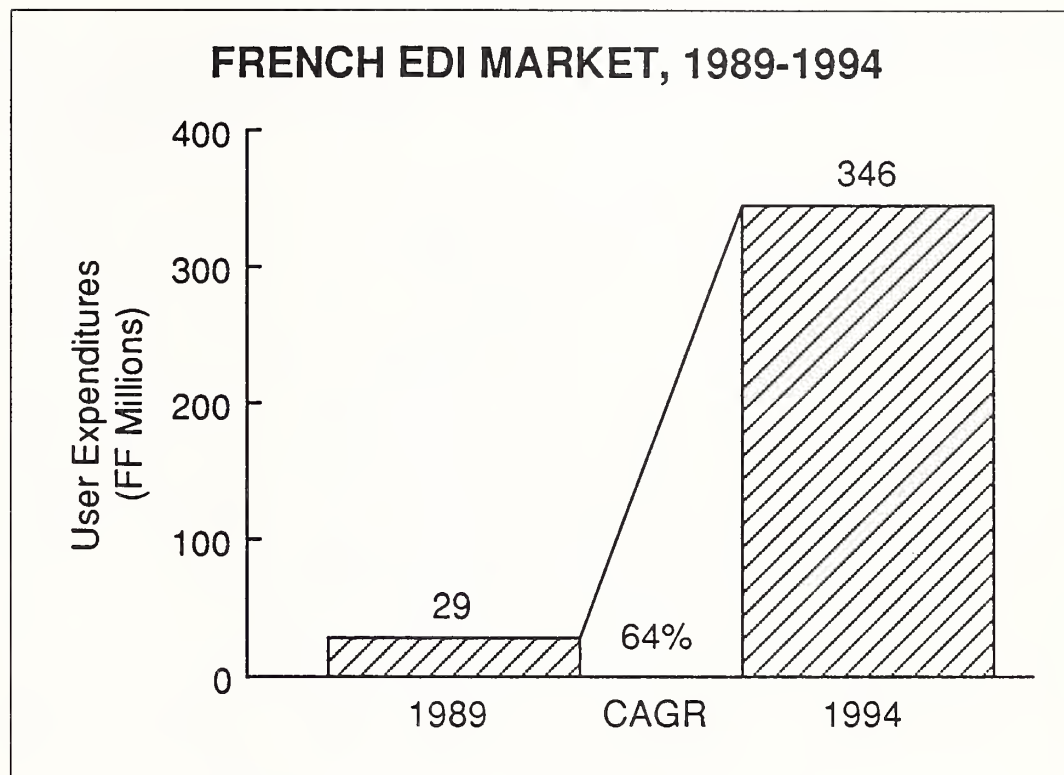
In the U.K., discrete and process manufacturing, services and retail and distribution are the fastest growing sectors reflecting the nature and business origins of the network service providers. Most vertical sectors in the U.K. are experiencing EDI activity with the exception of the catering industry that has been markedly inactive.

3. France

a. Market Size

France is the second largest individual country market for EDI software and services. The estimated size and growth of the French market is shown in Exhibit V-17. A market that will reach over 29 million french francs by the end of 1989 is expected to grow at a compound rate of 64% to reach almost 350 million by 1994, representing 20% of the Western European EDI market.

EXHIBIT V-17



The leading French EDI software and services vendors are included as Exhibit V-18.

The reticence shown by the French Government and the PTT to allow third-party suppliers to offer EDI services capable of serving a large range of sectors has hindered the development of a broader market.

Whilst France leads the rest of Europe in the implementation of EFT and videotex services, it lags behind the U.K. in the development of EDI. The retail, distribution, automotive and aerospace sectors are well advanced. The French are also well advanced in developing an automated customs system for transborder trade.

In late 1987, the French issued new rules for third-party providers, maintaining fixed rates on leased lines from the PTT. The rules restrict rates changes; the charges must be limited to no more than 15% for basic carrier services, with the balance from value-added services.

EXHIBIT V-18

LEADING EDI SOFTWARE AND SERVICES VENDORS, 1989 FRANCE

Rank	Vendor	1989 Revenues (FF Millions)	Market Share (Percent)
1	GEIS	13.5	46
2	GSI	6.4	22
3	Bull	2.6	9
4	Transpac	2.0	7
5	EDS	1.4	5
6	Axone/IBM	1.3	4
7	GLI	0.6	2
8	Télésystèmes	0.5	2
9	GTF	0.4	1
10	Segin	0.3	1
	Others	0.2	1
Total Market		29.2	100

Note: Percentages are rounded

b. Network Services

EDI is a major driving force in the X.400 market in France. Therefore, given the lack of established proprietary EDI services and combined with the timely emergence of X.400, it is not surprising that the network services provider, Transpac, has positioned itself as an EDI and X.400-based service provider. Transpac is well protected by the current regulations and more significantly, receives special tariffs whilst being able to

move into the domain regarded as the sole province of the service vendors (i.e., the development of private dedicated networks for client applications such as Esterel).

Transpac's market coverage, along with Interpac, which offers a private service of packet-switched data transmission at an international level based on CSC's Infonet network, provides it with an excellent platform for EDI services.

The completion of the pilot phase of the Atlas X.400 electronic mail service, which investigated those companies that were interested in linking via different X.400 protocols, has resulted in over 100 contracts, including 9 clearinghouses (including Bull, Digital, IBM, Hewlett-Packard and Télésystèmes), and almost 100 individual subscribers with a volume of 600 messages a day. Amongst these are industry groups such as GALIA (automotive) and EDONI (distribution) that are using Atlas X.400 for EDI. This development has undoubtedly created problems for the service providers, given Transpac's quasi-monopoly position since Atlas X.400 enters de facto into the EDI marketplace, enabling companies to exchange messages between non-compatible systems.

Transpac intends to offer decentralised solutions for translations and conversions, arguing that although the French have entered the EDI market behind the U.K., France benefits from a normalised X25 environment and thereby enjoys the existence of a standard.

Transpac has also teamed with Seres, the Bull/Cap Sesa joint venture, to develop a national network called TEDECO, which will link 2000 of France's largest towns and cities with the Finance Ministry. Plans are to link 50 cities by the end of the year. The network is expected to generate revenues of over \$3 million a year.

Transpac's network will be the transport mechanism for TEDECO. The administration and management of messages as well as the storage of public records and other archive material will be developed by Bull and run over host computers provided by them. Those computers will be integrated into the existing network, which also uses Alcatel computers.

Users will be offered the choice of connecting to the EDI network directly through host computers or through personal computers. Cap Sesa will develop software to allow the 10 different types of computers used by the participating cities to interoperate. The project will be overseen by a national assistance centre, manned by specialists in the types of software and formats used in the network.

The network will be based on the EDIFACT format. Users will be charged for every message sent over the network, for the amount of network time used and for supplementary assistance with software.

Transpac eventually hopes to link private companies with the Finance Ministry. The TEDECO project is also expected to generate other types of business, such as handling in-house messages between the headquarters of businesses and suppliers.

The French EDI market highlights the difference in approaches. IBM is taking the "product approach" with Axone; Seres is taking the "market approach", the development of specialist client applications, with the ALLEGRO project.

Bull (Seres) was also able to set up an EDI network in distribution for Gencod, an organisation with 8000 affiliated members, 7600 from the manufacturing sector and 400 from the distribution sector that exchanged stock and order information on tape and disk. ALLEGRO (Automisation des Liaisons du Langage Gencod par Réseau d'Ordinateurs) enables distributors and manufacturers to exchange invoices, orders and messages of various kinds between microcomputers. ALLEGRO does not yet offer mainframe-to-mainframe links Bull's stated intention has not been to develop prototypes but to get operational quickly, pointing out to dissenters that the structure of the Gencod language is very similar to EDIFACT. The position Bull has taken is to migrate users to EDIFACT as and when necessary.

Furthermore, Bull intends to open its internal EDI network, Media, which uses X.400 servers, to its business partners by moving the network from within companies to between companies. Bull's purchasing department is currently testing the use of the "purchase order," according to the profile recently finalised by EDIFICE.

Niche markets will succeed in France. For example, GSI's EDI activity is based essentially on the infrastructure of its network, which already links more than 5000 customers worldwide, and its areas of specialisation recognised in automotive, transport and tourism. The SNCF signed with GSI-Transports for all of its business with its 40,000 freight customers. This is the trend in France, resulting from Transpac's dominant position; different industry sectors use ad hoc commercial structures rather than those offered by the traditional service providers.

France differs from other European countries where industry is the driving force behind EDI. In France government agencies are playing a key supporting role for the technology. Part of the market for EDI software goes to packages developed by Sitpro, whose French equivalent, SimproFrance, along with the Customs service and external trade bureaucracies drive the market.

c. Software

There are a number of software companies in France developing EDI software, FTAM packages and application-specific packages. The software leader is GSI.

GSI approaches EDI from a different perspective. The company is developing its strategy in terms of economic sectors, treating data transfer in commercial terms rather than using a specific technique. Their software product, Dalog, is a totally transparent tool, functioning as a clearinghouse between different types of equipment, networks, both public and private, protocols, applications and standards (both specific or internationally endorsed).

Dalog integrates and constantly updates all of the information linked to the trading cycle, (reference of purchase order, invoice number, identification of shipment etc.) which is accessed by the various partners in the form that each requires.

Simprofrance is using two major tools to promote EDI in France: free software packages and alliances with industry associations. Over 150 companies are using the government's standardised official software package with all programmes being run by the EDIFACT board, whilst Simpro is working through three French industry associations, Galia (automotive), UIC (chemical) and GFT (freight forwarders/customs brokers) to promote EDI.

d. EDI Projects

Calberson's EDI project, GTF, known as Computerised Data Exchange, involves the transmission of financial and commercial data directly from computer to computer in order to improve the time, quality and reliability of goods transportation as the information is circulated unaltered in real time. Calberson controls 104 affiliated firms and employs some 14,000 people. In 1987, it had a turnover of 7.3FF million and net profits of 170FF million, making it one of the top 15 service firms in France.

Whilst LeHavre was the first French port to introduce a complete EDI system, Marseille was the first to integrate all of its services into one multifunctional terminal. In a bid to become the gateway to southern Europe as the single European market approaches, Marseille has a new cargo documentation system, known as Protis, which will begin with general cargo, containers and roll-on and roll-off exports, with imports planned to be added to the system in 1990.

The Protis Value-Added Network was created by Gyptis SA, a limited liability company set up by port users' associations. The system to

process exports will have cost 30 million francs and will absorb up to another 5 million francs for imports. Most of the funds have been loaned by IBM France Financement and will be reimbursed by the associations.

Subscribers pay a flat rate of 3,000 francs (\$500) per month to access the system; forwarders pay 30 francs per consignment; and agents pay 210 francs per call. Escale, the original member of the trio, controls vessel movements as well as bulk and oil traffic. The system, developed and run by the port authority, costs between 2,000 francs (\$330) and 7,000 francs (\$1650) a month, depending on the configuration of the user's equipment.

Marseille was the last of the six public sector ports to be connected up to the national customs network, Sofi. The process was delayed until November 1988 by a mixture of user reticence and risk of overloading the customs systems. In 1987, the port accounted for 6.6% of all declarations in France. Forwarders may present their declaration to any one of the five Marseille customs offices, also a first for the largest French port.

All of the Marseille networks have been developed to EDIFACT norms. At the moment, they do not interconnect. Because the Sofi system was developed by Bull, and the Protis system was developed by Axone in conjunction with the Alcatel subsidiary, TITN, the only way for data to be transmitted between them is by emulation. Work is under way to develop protocol convertors to transmit data between Protis and Sofi and Protis and Escale.

Software is also being developed to allow shipping agents to enter data on Protis and Escale networks at the same time. Each French port is following its own plan in developing EDI systems to meet different work methods and individual needs. Since most ships entering the Mediterranean call at several ports, Marseille is developing software to link to others. An Escale connection is operational with Barcelona; the goal is to sell the system to Algeria.

Furthermore, customs data is being transmitted between Marseille and Tunis on an experimental basis and the pilot should be completed by a reverse traffic later on. The Marseille authority has no plans for rival ports in the north, leaving it up to shipowners to transmit information via their own systems. Escale has replaced the earlier TPE system; bulk cargoes have not been included as the documentation required is not as complex. The current version of Escale became available in early 1988 and can be accessed either through user terminals or through the ubiquitous Minitel videotex system.

One of the major reasons for Teletel's success in France (discounting the distribution of free terminals) is the number of information providers on the system and the variety of information they provide. At the last count

there were over 10,000 information services ranging from transcripts of articles from the newspapers to specialised agricultural and pharmaceutical databases. Whilst Minitel is often maligned for its apparent lack of sophistication, it is capable of hosting sophisticated services. Interactive services, a feature not even available on most countries' implementations of a public videotex service, are not only available but are also the most popular services accessible via Minitel, allowing users to communicate directly with one another or with whole groups of people.

Teletel and Minitel are also proving themselves in the area of on-line linking, a variation of EDI, thanks to the introduction of France Telecom's Atlas X.400 message handling service. In recent months three nationwide cargo booking systems have been launched based on Atlas X.400 and Teletel.

The three systems include: Fretair, an air cargo booking system from British Airways, KLM and Swissair; a hauliers' and shippers' data exchange; and a "grain by train" system set up by the freight company of the national railways, SNCF Fret. The "grain by train" system involves a databank holding information on grain trains to be held on an external mainframe computer and accessible via Minitel for wagon bookings, confirmations and restrictions. Additionally, an electronic-mail system allows operational information to be exchanged.

The Fretair system allows some 350 of France's 450 air cargo agents and forwarders to instantly apply to the carriers for access codes. In addition the hauliers' and shippers' EDI system will allow entries to be transferred to a dump file within two minutes from the time that a contract is included via videotex. All three systems are capable of international comparison. Teletel now probably commands 90% of the entire Western European videotex market. A list of French EDI projects is given in Exhibit V-19

EXHIBIT V-19

FRENCH EDI PROJECTS

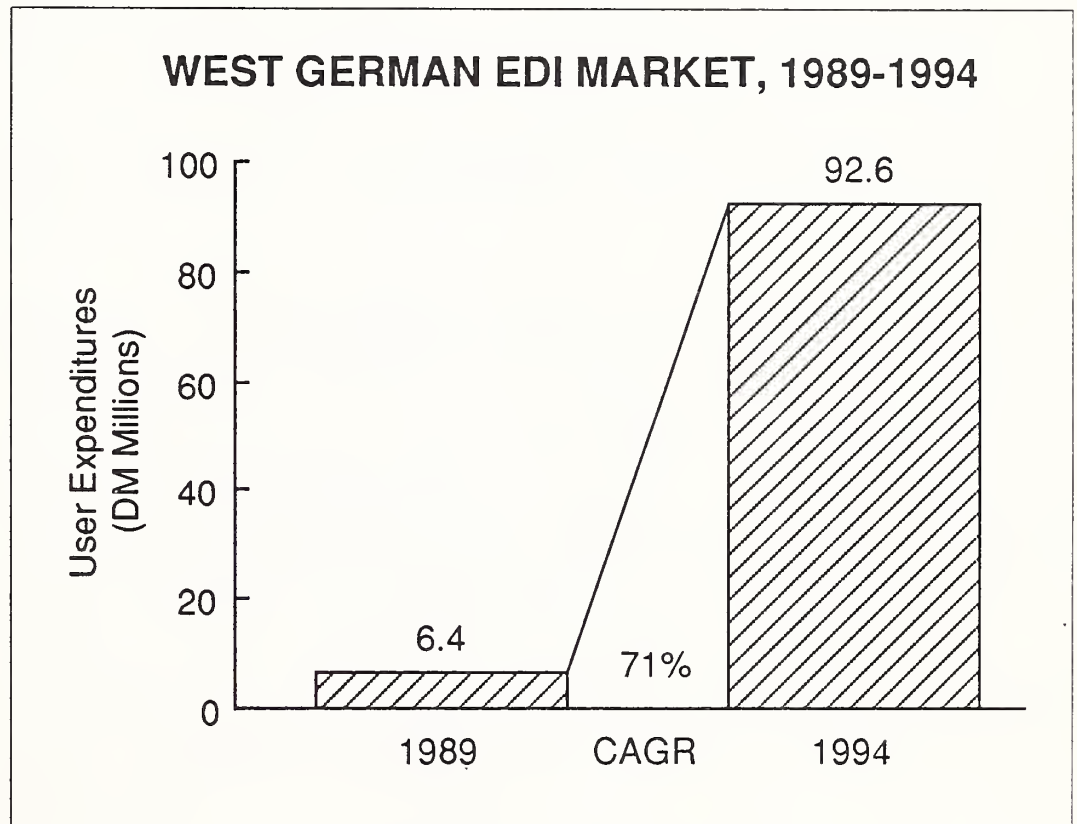
Area	Project	Edifact	Operational
Transport Sea	Ademar (LeHame)	N	N
	Protis (Marseille)	N	Y Axone
	Orca (Rowen)	Y	N Telesystèmes
	Edipoc (Cherbourg)	Y	N Simproframes
Rail	Docimel (Curtems)	Y	N
	Hermès (SNCF)	N	Y
Road	Cost 306	N	Y
	GTF (Calberson)	Y	Y GTF
	GSI		Y GSI
Air	Cargoimp (Paris)	N	Y Air France
Automotive	Galia (Odette)	N	Y Transpac
Distribution	Gencod (Ear)	N	Y Bull
Glass	Ediglas	Y	N
Records	Musik	Y	N
Pharmaceutical	Edipharm	Y	N
	Edimetal	Y	N
Mall Order	Edimorsel	Y	N
Negoce Industriel	Edoni		

4. West Germany

a. Market Size

The West German market for EDI software and services is anticipated to be worth 6.4 million deutschmarks at the end of 1989, rising to almost 100 million deutschmarks by 1994. The estimated size and growth of the West German market is shown in Exhibit V-20. The leading West German EDI software and services vendors are presented in Exhibit V-21.

EXHIBIT V-20



West Germany's highly export-oriented manufacturing economy has led to EDI within West Germany becoming a generic method of business communication implemented via leased lines the public network and the Datex-P data network. Border crossing and customs procedures are automated in several areas, as are several ports.

However, West Germany's ability to participate in trans-border EDI is inhibited by its bureaucracy as the country is the most highly regulated major Western European market, with the Deutsche Bundespost maintaining its telecommunications monopoly.

EXHIBIT V-21

LEADING EDI SOFTWARE AND SERVICES VENDORS, 1989 WEST GERMANY

Rank	Vendor	1989 Revenues (DM Millions)	Market Share (Percent)
1	GEIS	3.0	46
2	IBM	1.2	18
3	GLI	0.9	14
4	Actis	0.3	5
5	Software AG	0.2	3
6	EDS	0.2	3
7	Vascom/Siemens	0.2	3
8	LEP	0.2	3
9	SD-Scicon	0.1	2
10	Hungermann Bus	0.1	2
	Others	0.1	1
Total Market		6.5	100

Note: Does not add to 100% due to rounding.

The recent government legislation in West Germany, most of which mirrors the European Commission's Green Paper on the subject, means that provision of network services over public telephone, or private leased lines and both value added and non value added (i.e. basic) is to be allowed without restriction. the only exceptions will be that they do not entail the provision of transmission infrastructure or that they have as their primary aim the conveyance of unmodified speech.

The rule forbidding connection of private networks with public networks such as the PSTN or public data networks like Datex-P is retained,

however, striking a fatal blow against those organisations considering extensive private networks. The suggestion by the Witte Commission that the present 25km private network rule (which lets you do more or less what you like within a 25km radius as long as you do not link Bundespost services together) be extended to allow national coverage has been rejected on the grounds that it would endanger the Bundespost monopoly.

b. Network Services

Several car manufacturers have developed extensive EDI networks to provide direct links to their suppliers. By 1990, it is expected that most of the suppliers serving West Germany's six main car manufacturers will need to install facilities for EDI in order to compete effectively. In the case of Ford and Opel, 100% of suppliers will need to have adopted this mode of operation by 1990. The plan for BMW is 70% of suppliers by this time.

Volkswagen, which started as early as 1978, now has 250 of its suppliers linked up and expects to increase this number to 600-700 by 1990. Daimler Benz is in a similar situation. The company offers its suppliers a day of introduction to EDI technology. Porsche already has 50 of its suppliers connected and plans to add between 100 and 150 by 1990. Ford has developed a network called Fordnet. It offers its suppliers the necessary electronics hardware at no charge. Because of the proliferation of data formats and communications protocols and the likelihood of most suppliers making components for a large number of manufacturers in different countries, the Volkswagen, Daimler Benz and Ford solution (electronic interfaces that suppliers can link to a standard order-receiving computer) is costly and inefficient since it means that the supplier has to design and install separate terminals and modems for each of its customers.

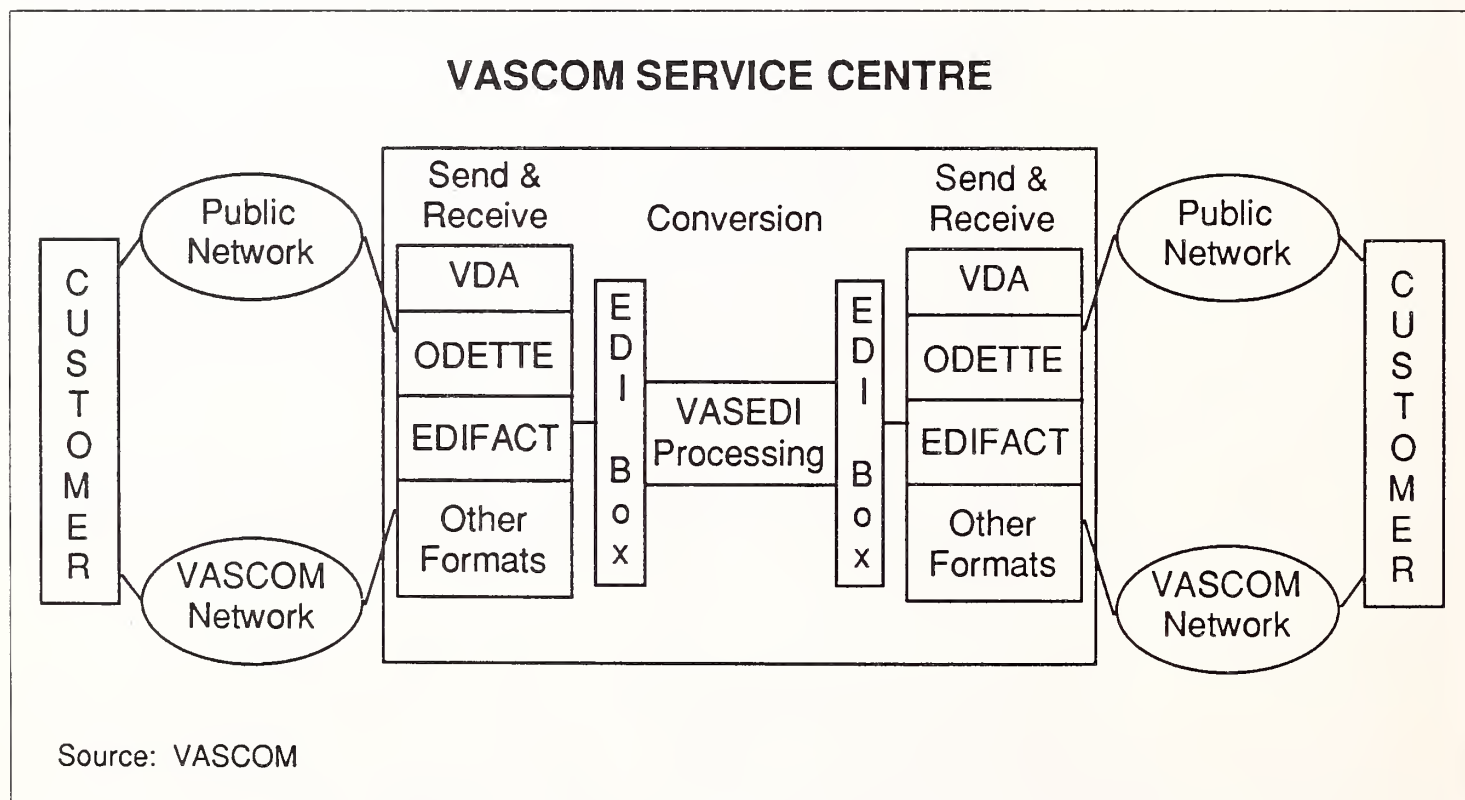
Although the U.K. "clearing-house" approach is an alternative, another option, which is gaining momentum in West Germany, is an interface that can handle a wide range of the currently used data formats and communications protocols.

Actis, a West German software vendor, has developed an interface for this purpose called the EDI box. It acts as a front-end interface for the supplier's PC; its software enables different information formats, sent by various car companies, to be handled. The product has penetrated the automotive industry in West Germany, Sweden, France and Belgium. This year Actis expects to sell 130 units. One Actis box has the ability to link eight parties concurrently (i.e., one supplier and seven automotive manufacturers). It is also able to link into proprietary networks such as Fordnet. The cost is between DM11,000 and DM70,000 (£22,000) depending on the number of links and formats it must handle.

This type of software will become increasingly important. Despite the emergence of ODETTE, the technology is still developing with a variety of systems in use for the foreseeable future. Whilst Odette is most widely used in the U.K., where it is not only used by automotive companies (British Coal, for example, has more than 200 suppliers linked up), Saab and Volvo in Sweden are currently the major automotive users of Odette in mainland Europe. Many other countries with companies in the automotive sector, including West Germany, are committed to it, also.

Siemens, a major player, entered the West German market with the introduction of Vascom in July 1988. The system will base EDI and other network services on the company's international network which has 400 nodes in over 40 countries. As part of the services, Vascom is offering VASEDI, a modular package of services covering everything from design, testing, realisation and operation to documentation and data protection. It includes features such as setting up communications links, sending and receiving data, format conversion, distribution, storage, data protection, data transmission, documentation and individual billing. Exhibit V-22 shows the VASCOM service.

EXHIBIT V-22



c. Software

The EDI software market in West Germany is developing in line with other leading country markets, such as the U.K. and France. In addition to Actis, the software company, GLI, has penetrated the West German market as well as other European country markets.

GLI's (Gesellschaft für Logistik und Informations-Systeme) main activities are in the area of logistics and information technology. The company participates in the international development of EDI standards and works closely with national and international institutions concerned with the coordinated introduction of automated commercial methods.

GLI offers GLI-Editor and GLI-Converter. The GLI-Editor comprises menu- and format-driven data entry for structures and parameters of in-house data and non-EDIFACT data; administration and maintenance of in-house file structures; predefined standard segments and service segments; predefined standard messages; adoption of non-EDIFACT structures to new standard messages; validation and reporting; and administration and maintenance of EDIFACT segments and messages.

The GLI-Converter comprises conversion of in-house structures into EDIFACT structures and reversion into in-house structures; processing of different messages in the same conversion run; error messages for file structures and database structures; and integration of other control functions.

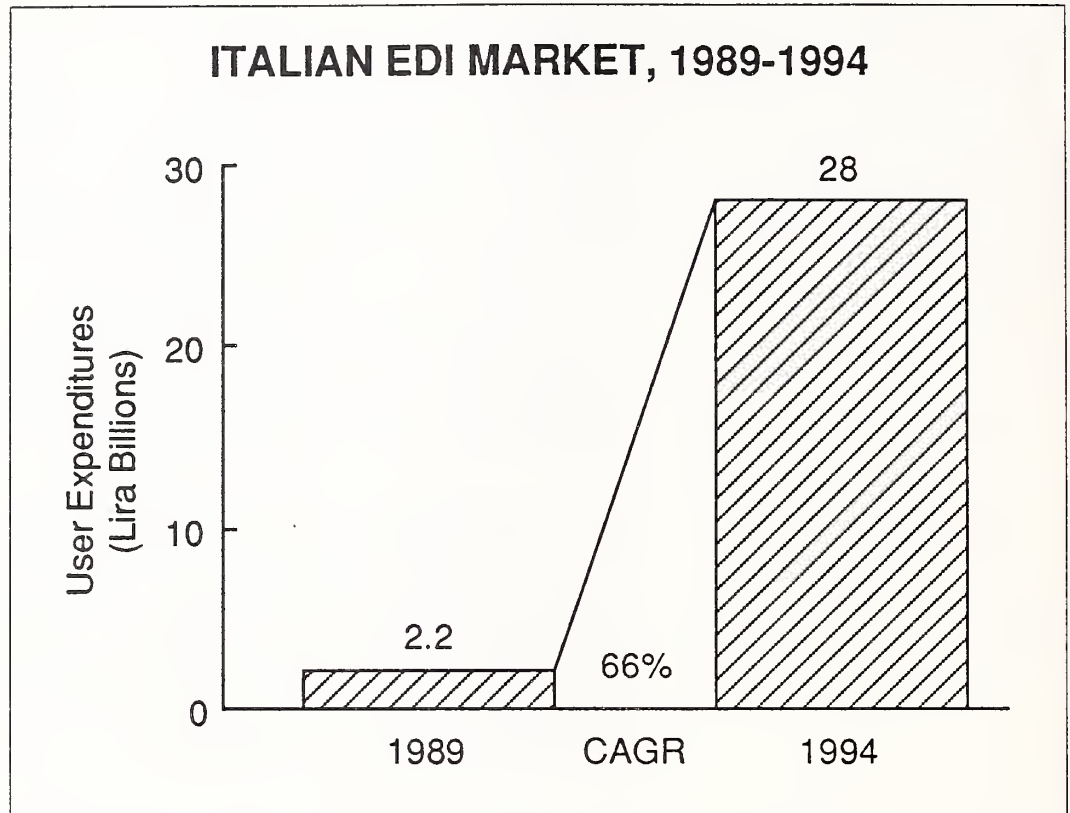
The GLI-Converter was tested using both internationally developed messages (EDIFACT) and messages from various branches (i.e., COST 306). Messages from other systems were also converted into the EDIFACT standard and then reconverted into the original system's form.

5. Italy

a. Market Size

The Italian market for EDI software and services is anticipated to be worth over 2 billion lira at the end of 1989, rising to almost 30 billion lira by 1994. The estimated size and growth of the Italian market is shown in Exhibit V-23. The leading Italian EDI software and services vendors are included as Exhibit V-24.

EXHIBIT V-23



1988 was a crucial year for the Italian telecommunications industry as it reorganised and rationalised its services in order to become more competitive in the European market. The development of its internal market has been hampered by the fragmented nature of its telecommunications environment and the lack of initiative by government and dominant commercial users.

b. Network Services

Italy has been plagued by problems with its network infrastructure. Ironically, Teledis, Italy's three year-old EDI service, was the first EDI service in Europe to be offered on a public telecommunications network. The service has a current user base of 20 retailers, 50 manufacturers, 50 financial institutions and 20 transport companies.

The Teledis service is operated by Televas using the Itapac X25 packet switching network. Televas is 51% owned by STET, Italy's state-owned telecommunications holding company and 49% owned by Feeruzzi Finanziaria, part of the Montedison Group. Italian users have joined Teledis, rather than a closed user group system to gain access to the Televas peripheral software that enables access and provides communication and application functions.

The general wariness towards using X25 in parts of Western Europe outside France is particularly significant in Italy. Televas is looking to provide a service that will serve as a type of one-stop shopping service

EXHIBIT V-24

LEADING EDI SOFTWARE AND SERVICES VENDORS, 1989 ITALY

Rank	Vendor	1989 Revenues (Lira Millions)	Market Share (Percent)
1	GEIS	850	38
2	Intesa	420	19
3	IBM	280	13
4	EDS	150	7
5	Televas	140	6
6	Teledis	130	6
7	Seat	100	5
8	Seva	80	4
9	Digital	30	1
10	Olivetti	20	1
	Others	10	1
Total Market		2210	100

Note: Does not add to 100% due to rounding

for pan-European EDI messages sent via X25 public packet switching networks.

Intesa, the IBM and Fiat joint venture, began marketing its network software and services in the first quarter of 1989. Its EDI services compete with those offered by GEIS, which holds over 40% of Italy's network services market.

Set in motion with funding of 20-30 billion lira, Intesa's goal was to develop a communications network and software for linking manufacturers to suppliers, distribution centres and transport and shipping companies. Although this has now been achieved, the Italian market will not fully blossom until next year. So far, EDI has only been used for the transmission of order and invoicing data. In the future, automotive companies, for example, will be using EDI to exchange engineering data.

Furthermore, the relatively small number of major corporations in Italy means that Intesa will take an appreciable portion of GEIS's business since Fiat, one of Europe's largest manufacturing companies, has been using GEIS for its communications. Fiat has expressed its intention to establish EDI links with 400 suppliers by 1990. Intesa and GEIS are likely to try to improve their positions in the market by acquiring some of Italy's smaller network services operators.

Intesa will be attempting to serve more markets and become less dependent on its parent companies. Since 1986, when the partnership began, most of Intesa's \$4 million sales have come from Fiat and IBM where new products are naturally tested. Intesa's significant advantage over many of its competitors is the right to operate its own switches on the public Fonia-dati X.25 packet-switching network. Whilst Italian law does not allow private companies to use their own switches except after reaching special agreements with the national telephone company, Intesa obtained the privilege under a special "Closed-User Group" program for important clients.

Intesa's specialised EDI, called EDIbridge, allows companies to exchange commercial documents in real time. The service, available either on-line through Intesa or as software, converts document formats and selects relevant information. EDIbridge employs EDIFACT standards, whilst Intesa is also offering an electronic mail service called Smart and a system of office document organisation called Trade.

Fiat is already testing Intesa's systems for manufacturing logistics called CVB and its system for administering stock for JIT, which is called CDV.

Recently, important ventures have been undertaken in Italy in order to increase the company awareness of the benefits of EDI. These include the EDIFORUM association and the recently established EDITER company. EDIFORUM is an association of companies that is promoting research in the field of legislative change and lobbying for legislative intervention. EDIFORUM is beginning practical experimentation of EDI along with paper-based book-keeping in order to compare the problems created by electronic trading. The main objective of EDIFORUM in Italy is to stimulate the spread of EDI. This objective aims at making both companies and the public administration as well as political organ-

isations responsible for telecommunications sensitive to these issues through the establishment of coordinated working groups and international projects in which decisions relating to EDI and technical standards are taken.

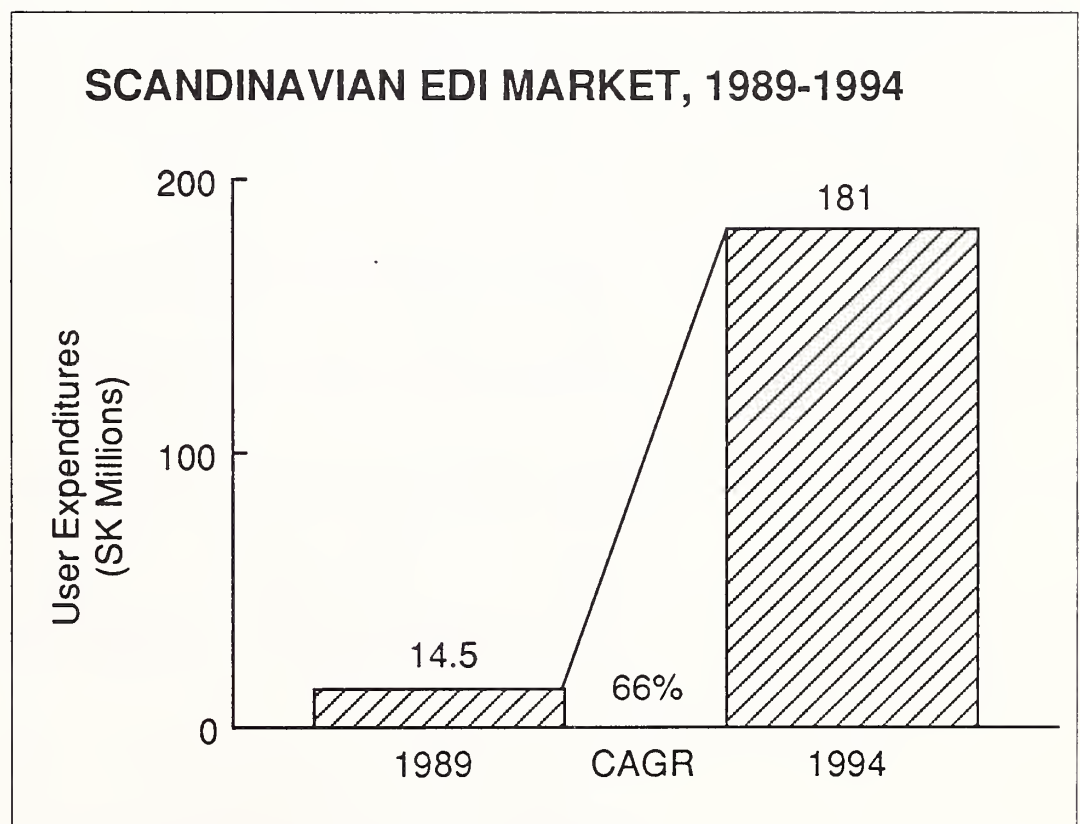
These new developments make it difficult to reach any definitive conclusions about the pace of adoption in Italy, but there is little doubt that the Intesa initiative will act as an incentive for Stet and GEIS to increase their promotional activities.

6. Scandinavia

a. Market Size

The Scandinavian market for EDI software and services is anticipated to be worth 14.5 million SK in 1989, rising to 181 million SK in 1994. The estimated size and growth of the Scandinavian market is shown in Exhibit V-25. The leading Scandinavian EDI software and services vendors are listed in Exhibit V-26.

EXHIBIT V-25



The Scandinavian markets are excellent markets for EDI due to high labour costs and dependence on international trade. The strategic importance of networks in Scandinavia is reflected by the high usage of MDNS for international traffic and EDI applications in the transport and trading communities.

EXHIBIT V-26

LEADING SCANDINAVIAN EDI SOFTWARE AND SERVICES VENDORS, 1989

Rank	Vendor	1989 Revenues (SK Millions)	Market Share (Percent)
1	GEIS	5.8	40
2	IBM	3.9	27
3	Danet	2.0	14
4	EDS	0.6	4
5	STS	0.4	3
	Others	1.5	11
Total Market		14.2	100

In Finland, the first concrete EDI project started in 1978 and 1979, called Finnpro. The project was backed by the public sector, the forest industry and transportation companies. In the early 1980s a similar project was launched for domestic trading called OVT (OVT is Finnish for EDI).

EDI is consequently being used, for example, in the forest products industry with approximately 15 companies trading with 100 international partners. However, EDI has still not really penetrated the market although there are pilot projects and multiple systems in almost all industries. These activities and the expansion of EDI is sponsored through units like EDIFIN and the Joint Working Party for Data Communications.

Swedish distributors use EDI under the Dakom standard. Currently over 50 wholesalers and 100 suppliers are involved with the larger companies using direct links and smaller firms using public or commercial data networks.

b. Network Services

In March 1988, Televerket announced plans to integrate its private and public networks and become the first carrier in the world to combine the use of its local exchanges as public telephone switches and as leased-line cross-connects. One of the potential problems Sweden is facing is the problem of standardisation of documents to EDIFACT, since many organisations, especially shipping lines, forwarders, importers and exporters have been trading electronically using Dakom standards for many years.

Since most Swedish companies already have highly sophisticated information networks and Sweden is such a high export-oriented country with multinationals such as Volvo, Saab and Electrolux, there is a dual need to keep abreast of EDI applications whilst at the same time encouraging industry to embrace EDI and either accept EDIFACT or adapt existing systems.

Sweden is one of the more active European countries in EDI, and the work of Swepro (Swedish Trade Procedures Council) has been to actively persuade the smaller concerns to become involved in EDI. Swepro discourages work on local projects, whilst stressing the need for any message designs to be fully international. This is consistent with the EEC ruling, although Sweden is not a member. Swepro, as a government agency funded by industry, works closely with EC organisations that are engaged in EDI projects as well as with Swedish Customs that is planning to have export procedures fully computerised by 1991 and an imports computer system installed by 1993.

GEIS is active in Scandinavia, targeting the automotive suppliers such as Volvo and Saab as well as vertical market sectors such as shipping, transportation, pharmaceutical, banking and distribution. GEIS offers network services as well as software (Trade PC, EDI*PC 5.0, EDI*T 2.4 and EDI*Central 1.1) and professional services.

Transport Data Link Corp. (TDL, Gothenberg) offers EDI services to approximately 15 companies in Scandinavia, U.K. and Belgium. Industries represented are transportation services, automotive manufacturers, financial services and insurance companies. A Swedish customs clearance and control system called TRK is also being developed.

The Danish PTT and IBM (Denmark) have formed the danNet joint venture for EDI applications. The service, which opened at the start of 1989, provides a basic EDI service that enables users to exchange EDI documents based on computer-to-computer communications, a conversion service that provides an interface between the user application software and the standard as well as an EDI workstation as a tool for small users and pilot projects.

Approximately 20 pilot projects are in different stages of planning and implementation, covering the insurance, banking, retail and construction fields. The next stage for danNet is to develop EDI services on top of OSI services, i.e., X.400 and FTAM.

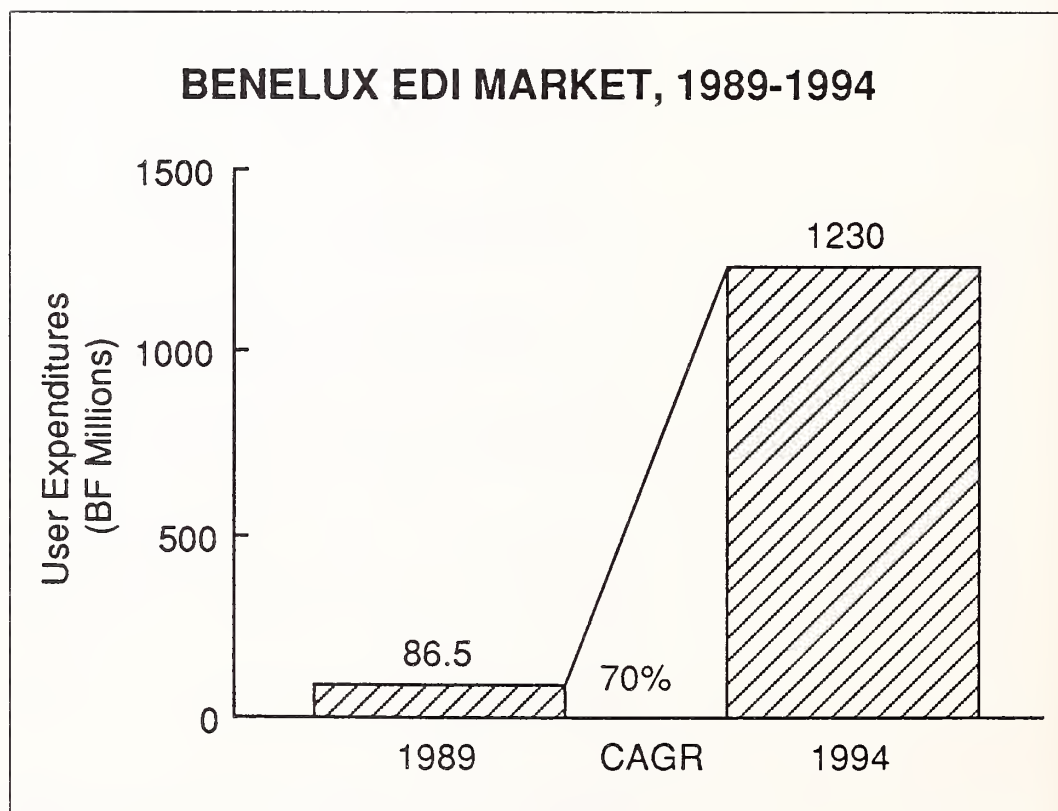
Five Scandinavian PTTs have formed Scandinavian Telecommunications Services AB (called STS) to offer a variety of telecommunications services to Scandinavian multi-national corporations. Scantel will compete with other European international carriers. Additional services are added as customer demand dictates, for example, X.400 E-mail products.

7. Benelux

a. Market Size

The Benelux market for EDI software and services is anticipated to be worth 86.5 million Belgian francs in 1989, rising to over one billion by 1994. The estimated size and growth of the Benelux market is shown in Exhibit V-27. The leading Benelux EDI software and services vendors are included as Exhibit V-28.

EXHIBIT V-27



At the beginning of the year the Dutch PTT was spun off into a private company, NV PTT Nederland, (shares are held by the state) which competes with the private sector. The company is divided into two subsidiaries, one for the postal service and one for telecommunications.

EXHIBIT V-28

LEADING EDI SOFTWARE AND SERVICES VENDORS, 1989 BENELUX

Rank	Vendor	1989 Revenues (BF Millions)	Market Share (Percent)
1	GEIS	35	40
2	IBM	15	17
3	Philips	10	12
4	EDS	6	7
5	GSI	5	6
6	SD-Scicon	5	6
7	GLI	4	5
8	Banque General de Belgique	2	2
9	Digital	2	2
10	Hewlett Packard	1	1
	Others	1.5	2
Total Market		86.5	100

The PTT telecommunications will retain its monopoly on the infrastructure, while losing its monopoly on equipment and services. This means that it will be competing with the private sector.

Belgium's telecommunications industry has been undergoing radical changes; previously tightly regulated, Belgium is now under pressure to defend its network against the threat posed by the large operators in France and West Germany. The country fears that these large operators may take a large share of Belgian network traffic. Deregulation in Belgium means an end to the duopoly that has traditionally supplied Belgium's telecommunications and networks. The duopoly consists of Antwerp-based Bell Telephone and Stea, the local off-shoot of the joint venture between Siemens and GTE of the U.S. Vendors have been pushing for the establishment of a separate, independent body to monitor the RTT's behaviour-control-type approval, which is currently the RTT's preserve. This organisation—the NAT Standards and Authorisation Institute—will also issue licences for private companies to provide services on leased lines and exercise a control over tariffs.

b. Network Services

Philips is marketing a range of EDI products and services, targeting Netherlands-based transport companies, such as the shipping line Nedlloyd and the international airline KLM as well as Dutch banks and freight companies. Philips, with outlets in more than 60 countries and \$500 million worth of goods moving between Philips sites at any one time, is a pioneer in EDI and has been closely involved in the design of structured-message formats, including EDIFACT.

Philips is offering a range of EDI hardware and software products commercially under the trade name of PHAME (Philips Advanced Means of EDI). The company is well placed to meet all of a company's EDI needs, provide a complement of computer systems, design software packages, encode and decode a customer's own message design to and from standard formats and to install networks. However, Philips is not currently offering network facilities to EDI users. The initial focus is on establishing bridges between internal EDI systems and other communities such as INTIS, the EDI network for the Port of Rotterdam and Transpotel, the network of European freight companies.

The INTIS network is a communications network for the exchange of information between companies and organisations in the transport industry, using the Dutch public network. Links have been established with Cargonaut, the information system for the air cargo industry and with Sagitta, the Dutch Customs' automated system for customs declarations. In addition, INTIS cooperates closely with other organisations involved in the development of standards for EDI in the transport industry, such as DEDIST (Scandinavia), the EDI Association (U.K.) and Seagha (Belgium).

INTIS has developed a number of software packages called Intisface that can be used on microcomputers to send and receive messages. It is available in various versions, such as Shipping Instruction and the Single Administrative Document (SAD). INTIS has gateways to the key GEIS and IBM international networks, thereby making it possible to set up links with other port systems such as MCP (Maritime Cargo Processing) in the U.K. INTIS also provides consultancy services.

ECT (European Container Terminals), the Rotterdam-based container handling company, was one of the first companies to identify the potential of EDI and is offering advisory services to trading partners. ECT and the port authorities consider EDI vital if Rotterdam is to stay ahead of its rivals. The terminal operators have been heavily involved in the establishment of INTIS. ECT is one of the biggest container-handling companies in the world with an annual throughput of around one million units. So far, it has been concentrating on advance information about a ship's loading and unloading requirements. Several retail distributors are also using the GEIS network.

Rotterdam harbour is being automated by a joint venture of the PTT, the Ministry of Economic Affairs and several private shippers, whilst the Antwerp Port Authority is being computerised to handle international trade documentation.

The market for EDI services in Belgium is influenced by its position as a European economic centre as well as the headquarters for various government bodies, multinational corporations and financial institutions including SWIFT, the electronic funds transfer network.

8. Spain

a. Market Size

The Spanish market for EDI software and services is anticipated to be worth over 40 million pesetas in 1989, rising to 700 million pesetas by 1994. The estimated size and growth of the Spanish market is shown in Exhibit V-29. The leading Spanish EDI software and services vendors are included as Exhibit V-30.

Spain is supporting the Odette programme set in motion by European motor manufacturers to promote the use of EDI. This involves the car manufacturers within the Association of Spanish Car & Lorry Manufacturers and a large number of suppliers, working in collaboration with Telefonica de Espana, Entel, APD, IBM Spain and Madrid Industrial Engineers.

EXHIBIT V-29

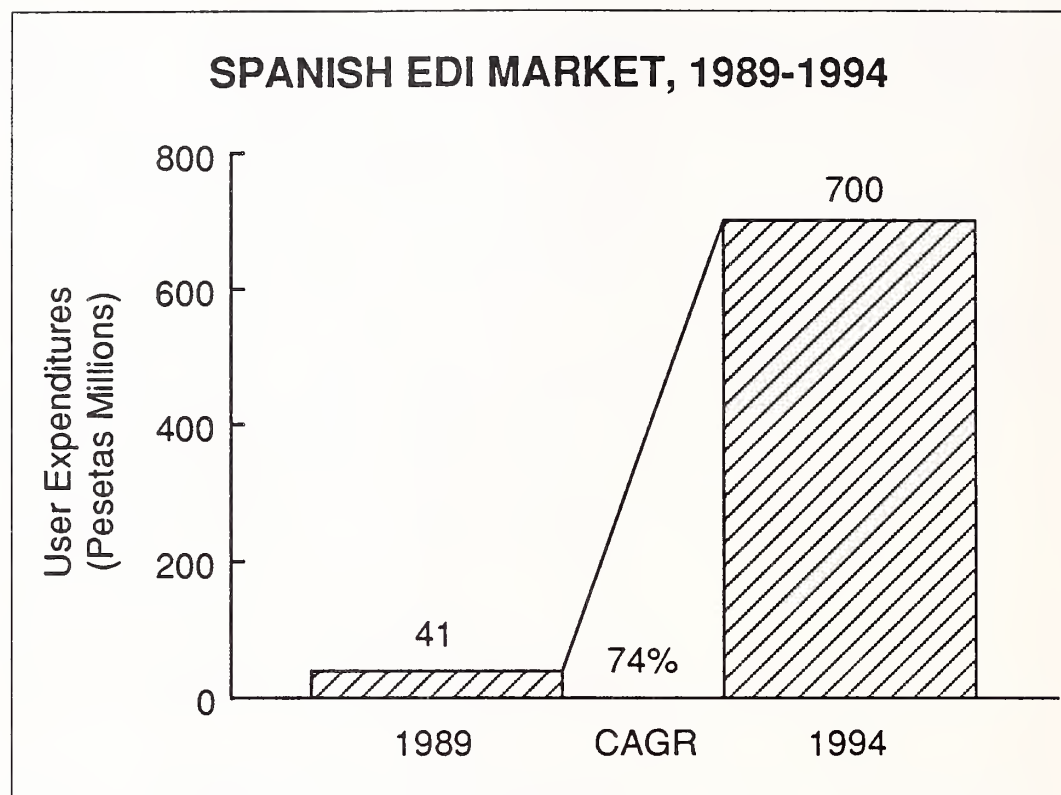


EXHIBIT V-30

**LEADING EDI SOFTWARE AND SERVICES VENDORS, 1989
SPAIN**

Rank	Vendor	1989 Revenues (Pesetas Millions)	Market Share (Percent)
1	GEIS	18	44
2	IBM	12	30
3	EDS	3	7
4	Hewlett Packard	2	5
5	Digital	2	5
	Others	4	10
Total Market		41	100

All of the hardware and software for the EDI system was designed by Entel. For the Spanish Ministry of Industry this idea of incorporating new technology into the production process as a way to improve the nation's competitiveness is just an example of what it would like to achieve in other sectors of manufacturing and services.

9. Rest of Europe

a. Market Size

The market for EDI software and services in the rest of Western Europe is anticipated to be worth \$0.35 million at the end of 1989, rising to \$6 million by 1994. The estimated size and growth of the market is shown in Exhibit V-31. The leading vendors of EDI software and services in the rest of Western Europe are listed in Exhibit V-32.

Hewlett Packard, based in Switzerland, has recently (February 1989) implemented EDI links using EDIFACT between HP's production sites in Boeblingen, Germany and the German subsidiaries of two suppliers, ITT-CANON and Bourns. The company intends to increase the number of EDIFACT links; pilots are in operation and the companies expect to have four production customer links to come on-line during 1989.

EXHIBIT V-31

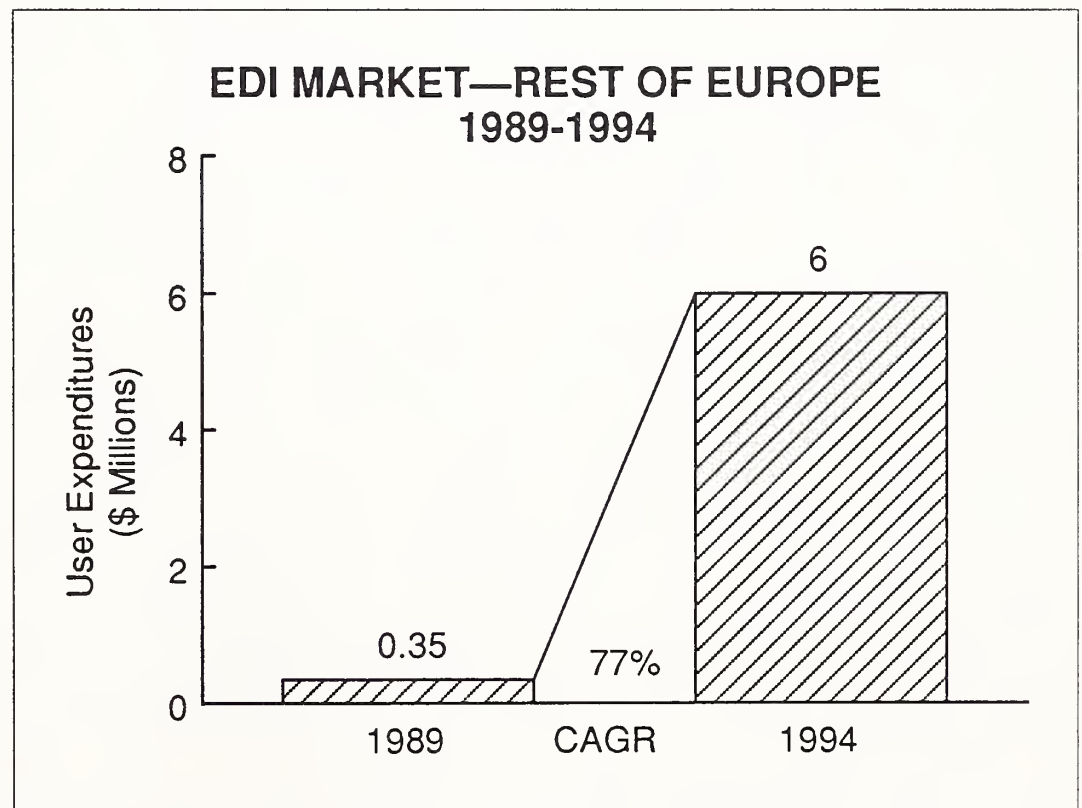
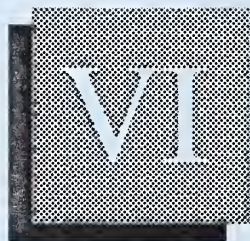


EXHIBIT V-32

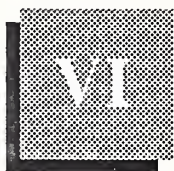
**LEADING EDI SOFTWARE AND
SERVICES VENDORS, 1989
REST OF EUROPE**

Rank	Vendor	1989 Revenues (\$ Millions)	Market Share (Percent)
1	GEIS	0.1	26
2	IBM	0.1	26
3	Hewlett Packard	0.1	26
	Others	0.08	22
Total Market		0.38	100



The User Environment





The User Environment

This chapter presents analysis and results of INPUT's user survey conducted in February and March 1989 regarding European EDI needs, concerns, market drivers and inhibitors.

A

Overall EDI Issues and Concerns

With the European market in different stages of development, INPUT's user research provides an important insight to the levels of concern and interest expressed by user management on the issues of standards, control and security, business practices and cost, especially since these are the concerns that will influence the degree of market acceptance, and consequently penetration. Most crucially, they will affect the success of users' EDI implementations.

1. Network/Data Security

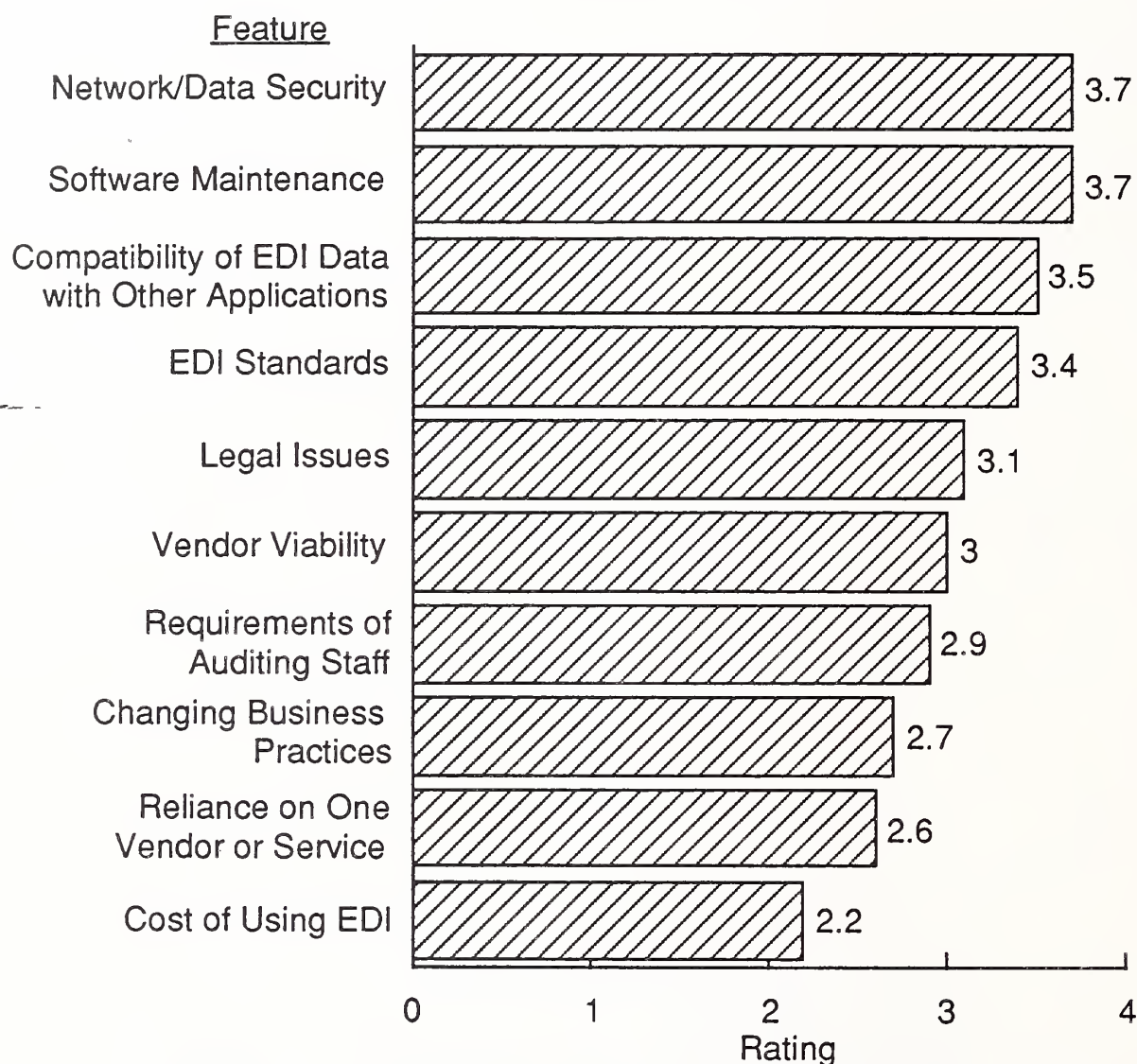
Information about a company is confidential. During EDI other companies are granted access to this information only to perform the required services in order to support the trading function. The current situation with regard to electronic trading makes that each company and third-party service provider responsible for keeping its data from unauthorised parties whilst the data elements that may be transmitted to authorised parties are specified in EDI standards.

Users interviewed by INPUT rated network and data security as the primary concern with a rating of 3.7 (on a scale of 5). This is illustrated in Exhibit VI-1. Naturally, some companies have higher security requirements than others and it tends to be the larger companies with sizeable individual transactions that are at greatest risk from misplaced decimal points or delays in transmission.

Furthermore, many companies are reluctant to discuss security; in addition to the potential leaks of competitive information, users are concerned about the potential legal implications of inadvertently altering another company's data.

EXHIBIT VI-1

USER ISSUES AND CONCERNS (Western Europe)



Source: INPUT User Survey

Rating scale 1-5: 1 = Unimportant, 5 = Extremely Important

Average standard error = 0.1

In the U.K., a common concern expressed was the vulnerability of information passing through third parties. However, the vendors were quick to point out the importance of their role as "honest broker," offering a layer of security since trading partners do not directly access one another's computers.

One solution has been to use a microcomputer (or other processor) as an EDI front-end that addresses this problem. It should be noted that vendors are taking the security issue seriously, especially in regards to compromising the trust between themselves and the customer.

To this end, EDI systems are designed to provide a high level of security with multilevel password capabilities, call-back sequences and storage techniques to distribute file information, making it difficult to assemble information without authorisation. Also, security audits are performed covering physical as well as data security.

Finally, it may well be that the concern over security has hindered the development of EDI-generated databases since the service providers are understandably reluctant at this early stage in market development to propose that EDI data be used because it may lead to the perception of security and trust violations. There are two methods of addressing the security issue through technological means:

- Authentication uses a method that verifies that the content of a message or transaction remains as it was originally sent and that the individual authorised to send the transmission did, in fact, do so.
- Encryption "scrambles" data, requiring a key to reassemble data into its original form. This method has been difficult to manage, since an error will leave all data in the transaction unusable.

2. Software Maintenance

Software maintenance involves several aspects, including upgrades, repairs and maintenance standards. EDI software typically adopts the latest standard version whilst supporting earlier releases for companies in transition.

Users averaged their concerns on software maintenance at the highest rating with many professing doubts about the overall standards situation in Europe and within that expressing concern over software maintenance. The need for software vendors to provide a complete picture of the situation and to provide customers with continual updates will become particularly crucial in the run-up to the single European market.

3. EDI Compatibility with Other Applications

As EDI becomes more of an integral way of doing businesses, users are being faced with the need to interface EDI data with other applications. No real consensus emerged regarding implementations to ease the integration of EDI data with other applications. However, most responses suggest that users are focused on their internal structures in this area. In

West Germany where the majority of EDI is carried out on an intra-company level a very high rating is given to this issue. This is illustrated in Exhibit VI-2.

EXHIBIT VI-2

USER ISSUES AND CONCERNS (By Country)

Feature	Total W. Europe	F	UK	W G	I	BNL	SK	E	Rest
Network/data security	3.7	3.3	3.7	3.1	4.0	4.2	4.3	3.6	3.6
Software maintenance	3.7	3.6	3.8	3.1	4.0	3.9	4.3	2.8	4.0
Compatibility of EDI data with other applications	3.5	3.0	3.5	4.8	3.2	3.4	3.7	3.8	3.6
EDI standards	3.4	3.5	3.7	4.3	3.2	3.9	4.3	3.8	3.4
Legal issues	3.1	2.6	2.9	3.7	3.5	3.5	3.3	4.0	2.0
Vendor viability	3.0	2.5	3.3	3.4	3.1	2.9	0.1	4.2	3.4
Requirements of auditing staff	2.9	2.3	2.8	3.5	3.2	2.6	3.3	2.0	3.4
Changing business practices	2.7	2.3	3.5	3.3	3.5	2.6	2.3	3.6	2.4
Reliance on one vendor or service	2.6	2.3	3.4	2.9	1.8	2.5	2.3	4.2	3.2
Cost of using EDI	2.2	2.8	2.9	2.0	1.6	2.6	3.3	1.8	3.0

Rating scale 1 to 5: 1=unimportant and 5=extremely important

Source: INPUT user survey

Average standard error=0.1

4. EDI Standards

The issue of standards has been discussed in an earlier section of the report and is related to the two previous issues, of software maintenance and compatibility of EDI data with other applications. There is much confusion in Europe over the roles of the various EDI standards-making organisations and the need to adopt EDIFACT as opposed to a national or industry-specific standard.

Users are often dealing with partial information since they are not directly involved in the standards-making process. Nonetheless, the unsettled status of EDI standards is inhibiting the development of the market and in some cases (particularly in mainland Europe) too much time has been spent waiting for EDIFACT message standards.

This is in direct contrast with the sectors where EDI growth is strongest, especially where a cross-industry standard (e.g. TRADACOMS) has had the effect of encouraging cross-industry trading. This would appear to be the best approach since one of the problems facing any standards body is that multiple parties have needs that must be accommodated and decisions are made on a consensus basis.

National or industry standards are developed more quickly since the "user community" is more closely knit and shares common interests.

5. Legal Issues

The acceptance of EDI-transmitted documents as binding contracts is left to negotiation between individual buyers and sellers. Trading partners usually agree prior to electronic trading that EDI documents will have the same status as their paper-based equivalents, carrying the same terms and conditions as previously used methods.

The overall rating of this issue was 3.1, with lower ratings in France (2.6) and the U.K. (2.9) where the volume of EDI transactions is high and the highest rating in Spain (4.0) where EDI volumes are correspondingly low. At this stage, no industry-wide contract exists and legal issues are best resolved by individual trading partners.

6. Vendor Viability

Users need to be reassured that any investment or effort incurred evaluating vendors and encouraging their trading partners to use a specific vendor will not be ill-conceived. In particular, vendors rumoured to be acquisition candidates, or facing unfavourable financial reports need to reassure users of their fiability and their viability .

This issue rated a 3.0 overall with Spain giving the issue the highest rating of 4.2. This particular issue, however, is not necessarily linked to EDI, since vendor viability is always likely to be a user concern in the current European climate.

B

Third-Party Networks

Exhibit VI-3 shows users' average satisfaction ratings regarding their current network service providers across Western Europe. Exhibit VI-4 gives a breakdown by country market.

EXHIBIT VI-3

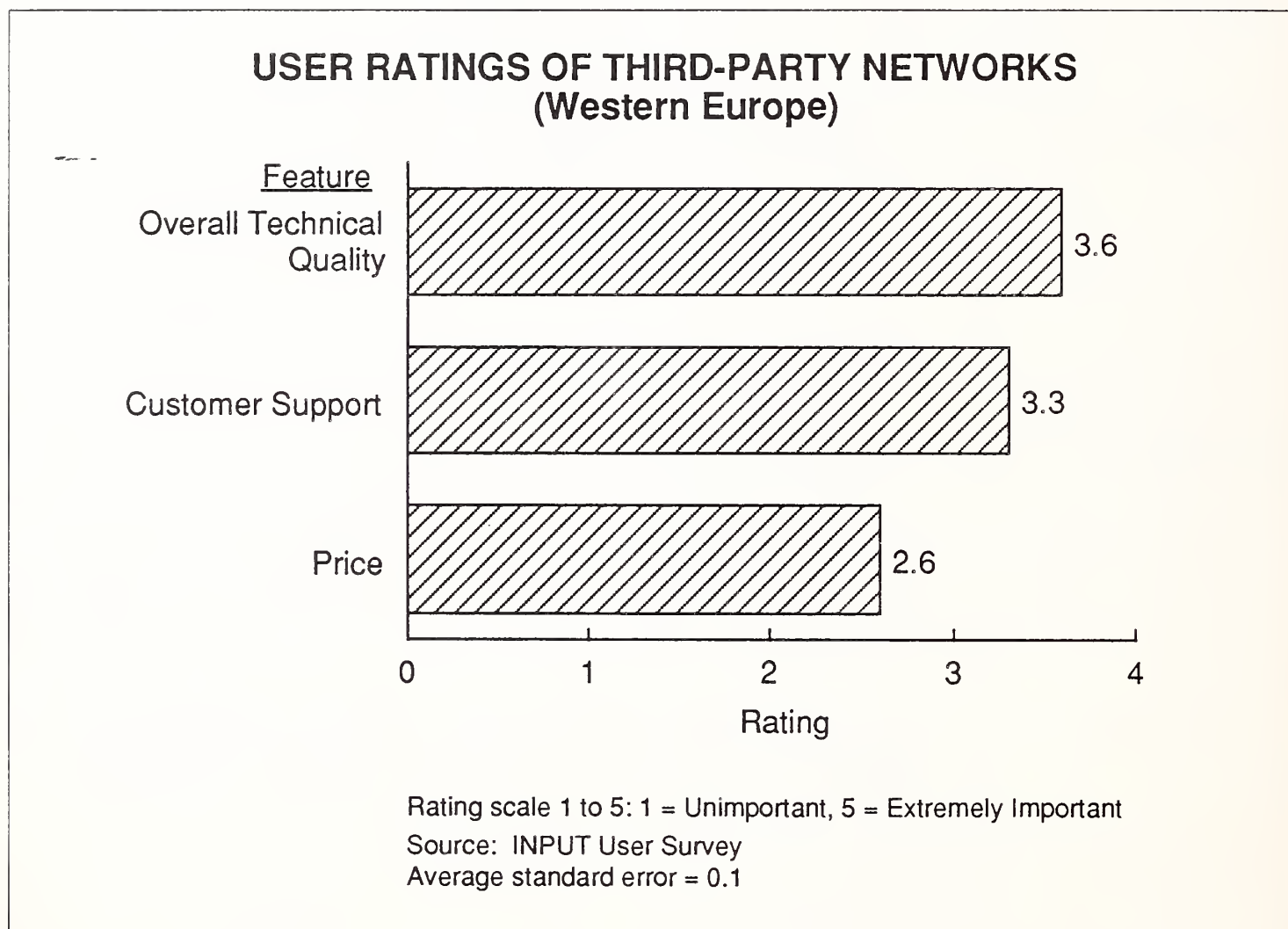


EXHIBIT VI-4

USER RATINGS OF THIRD-PARTY NETWORKS (By Country)

Feature	Rating								
	Total W. Europe	F	UK	W G	I	BNL	SK	E	Rest
Overall technical quality	3.6	3.0	3.1	4.3	4.0	4.0	3.7	3.0	3.8
Customer support	3.3	3.8	2.6	3.7	3.6	3.4	2.0	4.0	3.0
Price	2.6	3.2	3.0	2.5	3.0	2.8	2.0	2.0	2.0

Rating scale 1 to 5: 1=Unimportant and 5=Extremely Important

Source: INPUT User Survey

Average standard error=0.1

The purpose was not to rate individual network services since this would have only been possible if all of a service's customers had been interviewed. Nonetheless, the results do indicate the importance of customer service; several respondents voiced dissatisfaction with the service providers on this issue. Some of the comments are included as Exhibit VI-5.

Invariably, companies with the largest number of users received criticism. Whilst this can be attributed to the speed of growth and the difficulties in keeping up with users' expectations, there are also other mitigating factors:

- Many users have been the "victims" of the hub/honeypot approach; that is to say that many of the companies using the service are not totally willing participants and may be unfamiliar with computerised techniques increasing the need for adequate support.
- Users' expectations have been too high and the path to successful implementation has not been sufficiently explained.

EXHIBIT VI-5

**USER CONCERNS WITH
THIRD-PARTY NETWORKS**

- Expensive, deters smaller companies
- Poor quality
- Implementation takes too long
- Insufficient customer support
- No uniform documentation
- Price increases
- Nonstandard protocols
- Do not meet expectations
- Problems with software

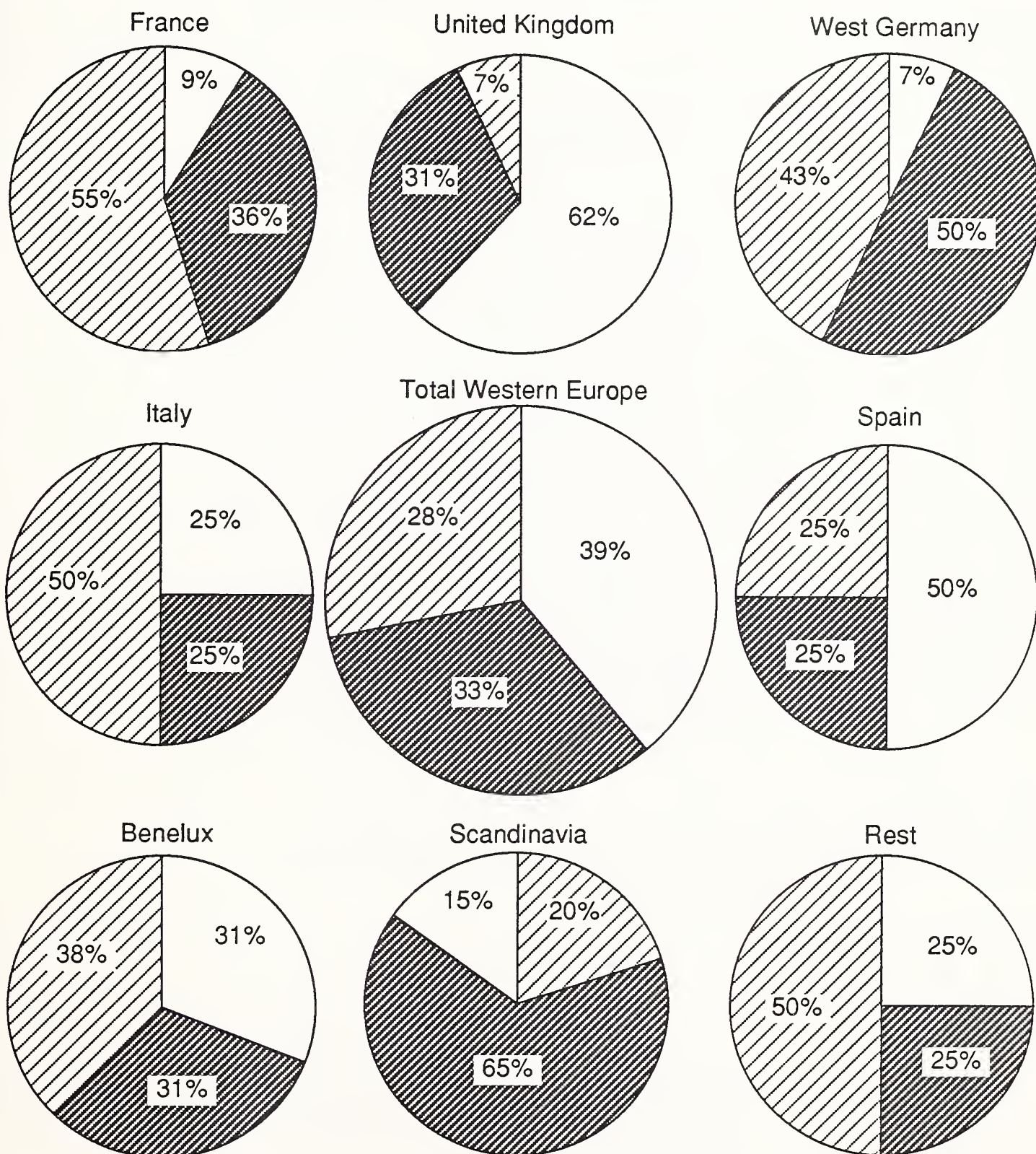
These findings highlight the importance for users to establish effective user groups to serve the needs of the EDI community.

C**Interconnection**

The percentage of users accessing their trading partners using a combination of direct interchanges and a third-party service was high, 33% for Western Europe. This is illustrated in Exhibit VI-6. This figure is substantially higher in Scandinavia (65%) and West Germany (50%) and lower in Italy (25%) and Spain (25%). This high percentage suggests that users' needs for interconnection are higher than vendors are prepared to admit and not being adequately resolved.

EXHIBIT VI-6

THIRD PARTY VERSUS DIRECT EDI



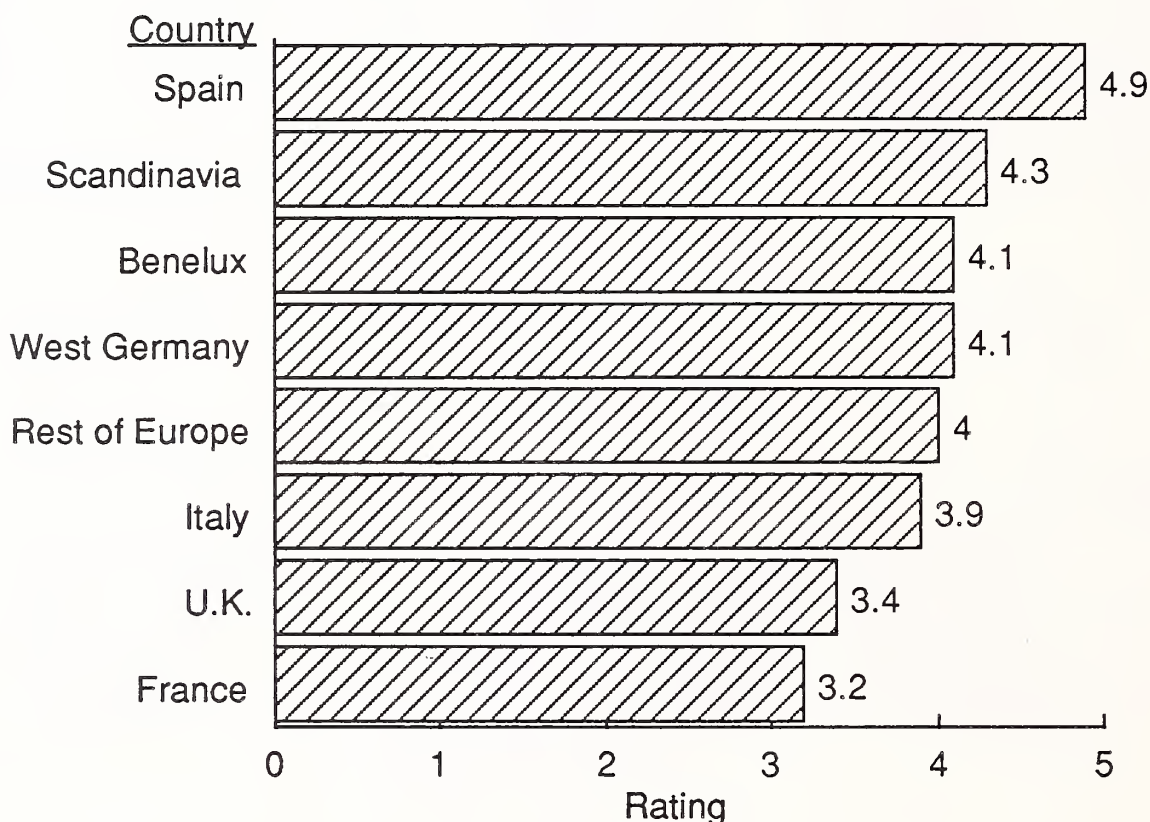
□ Third Party ▨ Combination ▩ Direct

Source: INPUT User Survey

When asked to rate the importance of interworking, all country markets with the exception of the U.K. and France, gave the issue a high rating. Spain gave the highest rating of 4.9, on a scale of 5. These figures appear in Exhibit VI-7.

EXHIBIT VI-7

EDI ISSUES: HOW IMPORTANT IS NETWORK INTERCONNECTION?



Rating scale 1 to 5: 1 = Unimportant and 5 = Extremely Important

Source: INPUT User Survey

Average standard error: 0.1

The low ratings given by the U.K. (3.4) and France (3.2) can be attributed to direct communication with trading partners by the majority of companies in France (55%), and in the U.K. a large proportion of users trading within a limited community that uses one network exclusively. Sixty-two percent of the U.K. respondents were using a third-party network.

The reasons given by users for interconnection were business related, including: the need for global communications, increased flexibility and the optimisation of resources, improved access to the customer base, stimulation of growth and cost reduction. These are highlighted in Exhibit VI-8.

EXHIBIT VI-8

REASONS FOR NETWORK INTERCONNECTION

- Global communications
- Growth stimulation
- Access to customer base
- Increase flexibility
- Cost reduction
- Optimisation

Network interconnection is a prerequisite for the successful development of a pan-European EDI market. As opposed to maintaining multiple equipment settings for several networks and tracking the users of each network, a user's EDI transactions should be transmittable in one session through one network for distribution to partners regardless of their network selection.

Although some interconnection capabilities are now available (INS/Istel, Istel/IBM, INS/GEIS, GEIS/EDS), in most cases additional charges are incurred. These changes are resented by users, who, with some justification, resent being charged double by each vendor.

However, interconnection has proved to be a difficult issue from a vendor's perspective. Whilst naturally a vendor wishes to service a customer's needs, interconnection with competitive networks invariably results in handing over business and responsibility for the transaction.

As mentioned in a previous section, the long-term solution may be offered by the adoption of the X.400 message-handling standard, which will facilitate interworking communications and resolve vendor gateway development issues, enabling companies to use a common X.400-based facility rather than having to build unique gateways for each network connection.

Most importantly, however, interconnection, whether via-X.400, FTAM or gateways, will change the marketing dynamics of EDI. Vendors will need to differentiate themselves through image, position, variety of network services and market specialisation rather than simply network reach. At this point, EDI will have truly become a generic way of doing business.

D

EDI Software Issues

1. Choosing the Software

INPUT asked current EDI users whether they had written, purchased or purchased and then customised their EDI software. As Exhibit VI-9 shows, almost half of those interviewed purchase their EDI software; approximately one-third chose to write their own software; nearly one-fifth bought and customised their EDI translator.

EXHIBIT VI-9

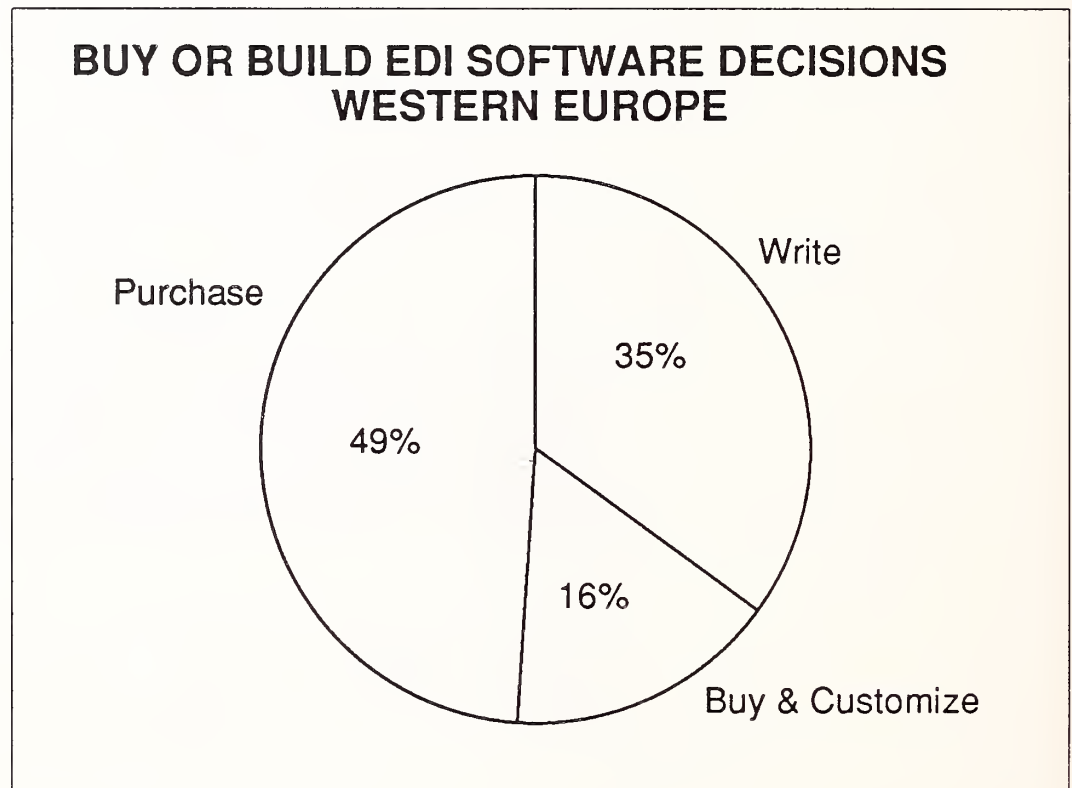
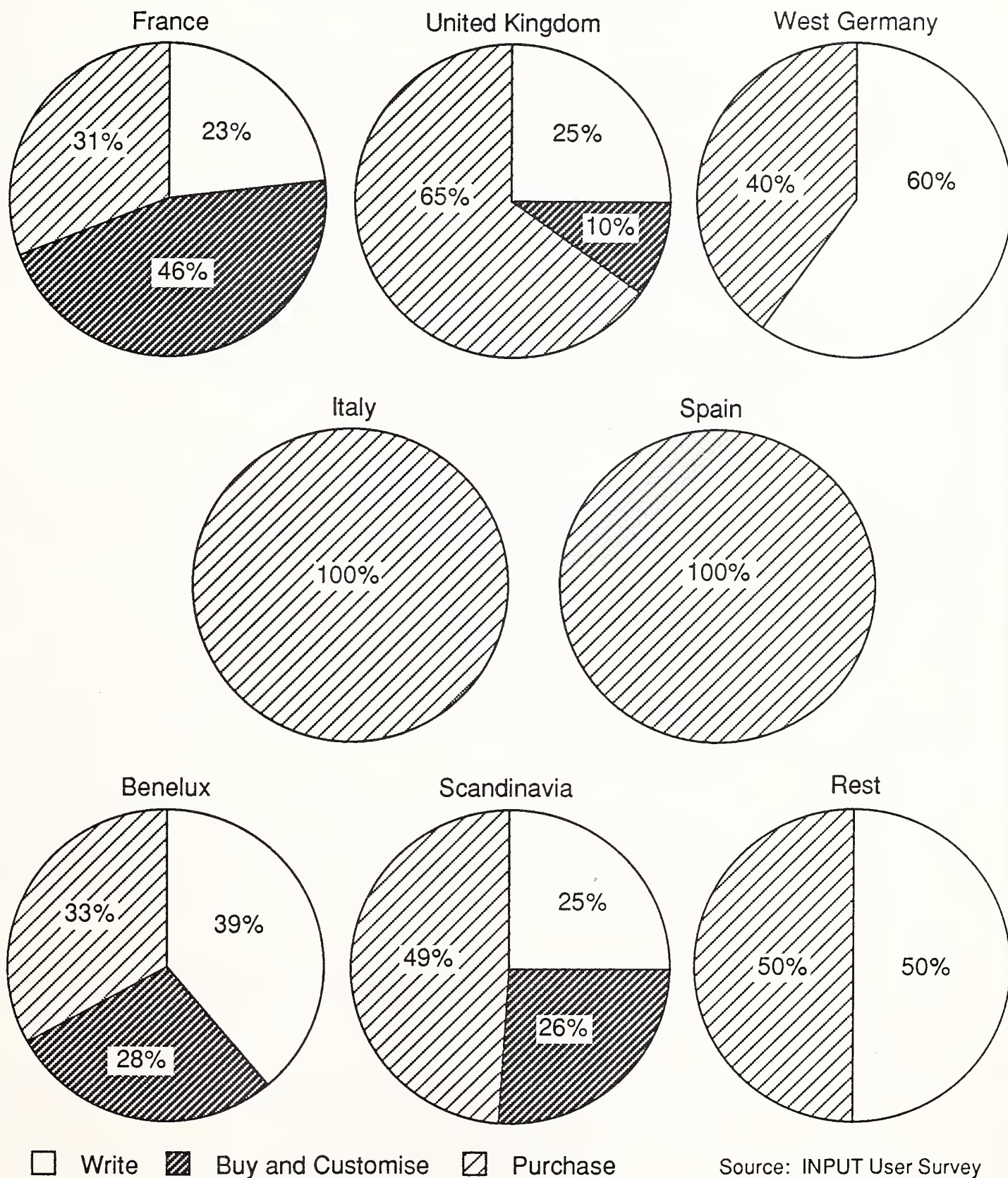


Exhibit VI-10 illustrates the differences between country markets and the difference between the U.K. and France is, once again, particularly significant, showing how the two leading European markets are developing in distinctly different ways on a variety of issues.

In the U.K. 65% of users bought their EDI software with only 10% buying and then customising; in France almost half the users (46%) bought and customised their software, with only 31% simply buying the software.

EXHIBIT VI-10

BUY OR BUILD EDI SOFTWARE DECISIONS—BY COUNTRY

U.K. comments included:

"We were told to do EDI and we couldn't afford to develop it (the software) in-house."

"Force of circumstances."

"Plenty of packages available. We always buy in our software. Why change for EDI?"

French comments included:

"We wanted to take a package and then design it to our own specifications."

"We have the technical expertise, so why not?"

"Nothing we saw suited us 100%. In such a circumstance, we did the next best thing. We customised."

2. Software Features

INPUT interviewed current EDI users about the relative merits of a list of features. Exhibit VI-11 illustrates the average response for Western Europe, whilst Exhibit VI-12 gives a breakdown by country market.

The two highest-rated features were the capability to easily upgrade the package to support new standards and successful transmission acknowledgement. Upgradability was considered the most important feature in the most developed markets of France, the U.K., West Germany and Benelux. Successful transmission acknowledgement was the most important feature in the less well-developed markets of Italy, Scandinavia and Spain.

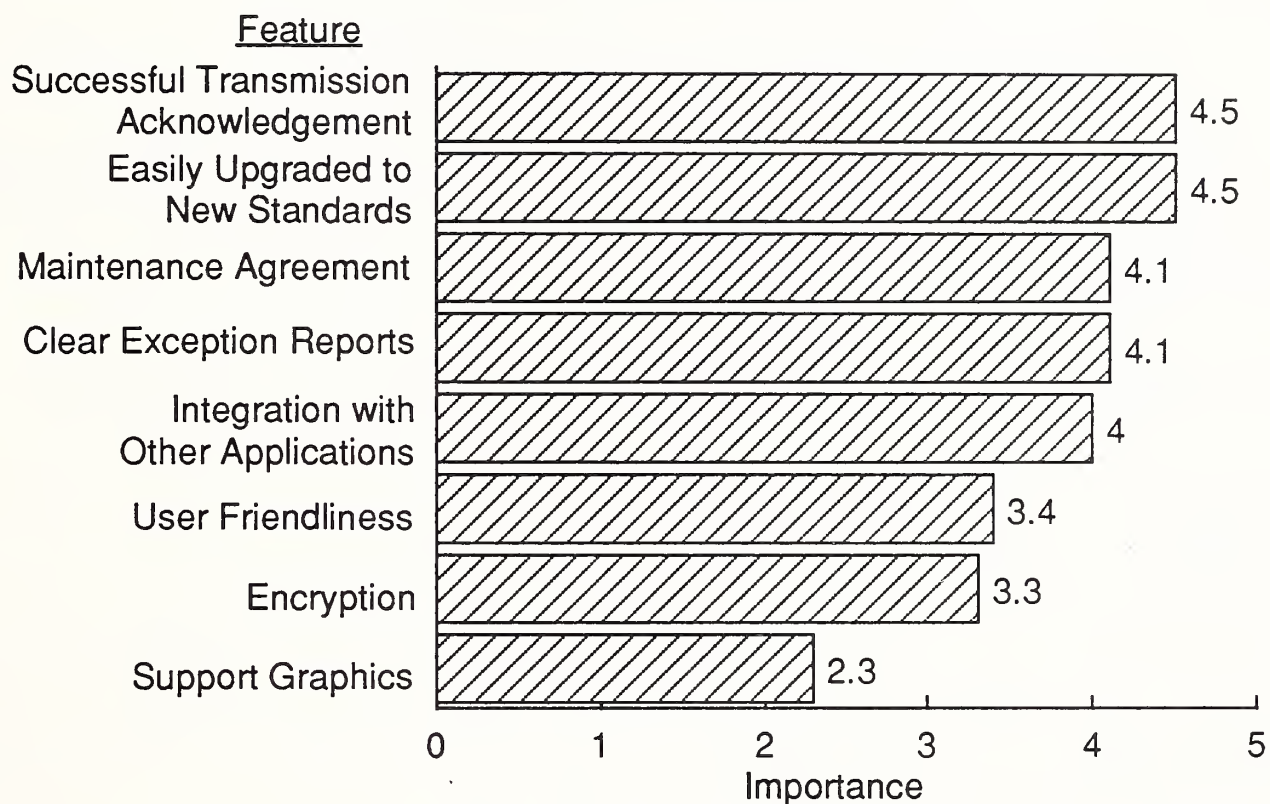
It would be expected for the least developed markets to be concerned about knowing whether an EDI transmission was successful and if any transaction was refused because of improper entries. Most EDI software does in fact provide exception reports that identify data elements not conforming to a standard.

The third- and fourth-rated overall features, availability of a maintenance agreement (4.1) and clear exception reporting (4.1), are related to the first and second.

Graphics in association with EDI are being used in some industries, but in general, users do not see this feature as important and in all countries it received the lowest rating.

EXHIBIT VI-11

SOFTWARE FEATURES IMPORTANCE (Total Western Europe)



Source: INPUT User Survey

Total Sample: 100

Rating scale 1-5: 1 = Unimportant, 5 = Extremely Important

Average standard error = 0.1

EXHIBIT VI-12

SOFTWARE FEATURES IMPORTANCE (By Country)

Feature	Importance Rating								
	Total W. Europe	F	UK	W G	I	BNL	SK	E	Rest
Successful transmission acknowledgement	4.5	4.4	4.7	4.5	4.6	4.4	4.3	4.6	4.4
Easily upgraded to new standards	4.5	4.2	4.5	4.3	4.8	4.1	4.7	4.8	4.2
Maintenance agreement	4.1	3.8	4.7	4.4	4.2	3.8	3.3	4.6	4.0
Clear exception reports	4.1	4.2	4.7	4.0	3.2	4.1	4.0	4.0	4.2
Integration with other applications	4.0	3.0	3.5	4.4	4.0	3.6	4.0	4.6	4.5
User friendliness	3.4	3.7	3.6	4.0	3.5	3.8	2.7	3.8	2.0
Encryption	3.3	3.3	2.7	3.1	3.0	3.1	3.0	4.0	4.1
Support graphics	2.3	2.0	1.9	2.5	2.0	2.3	2.7	3.0	2.0

Total sample: 100

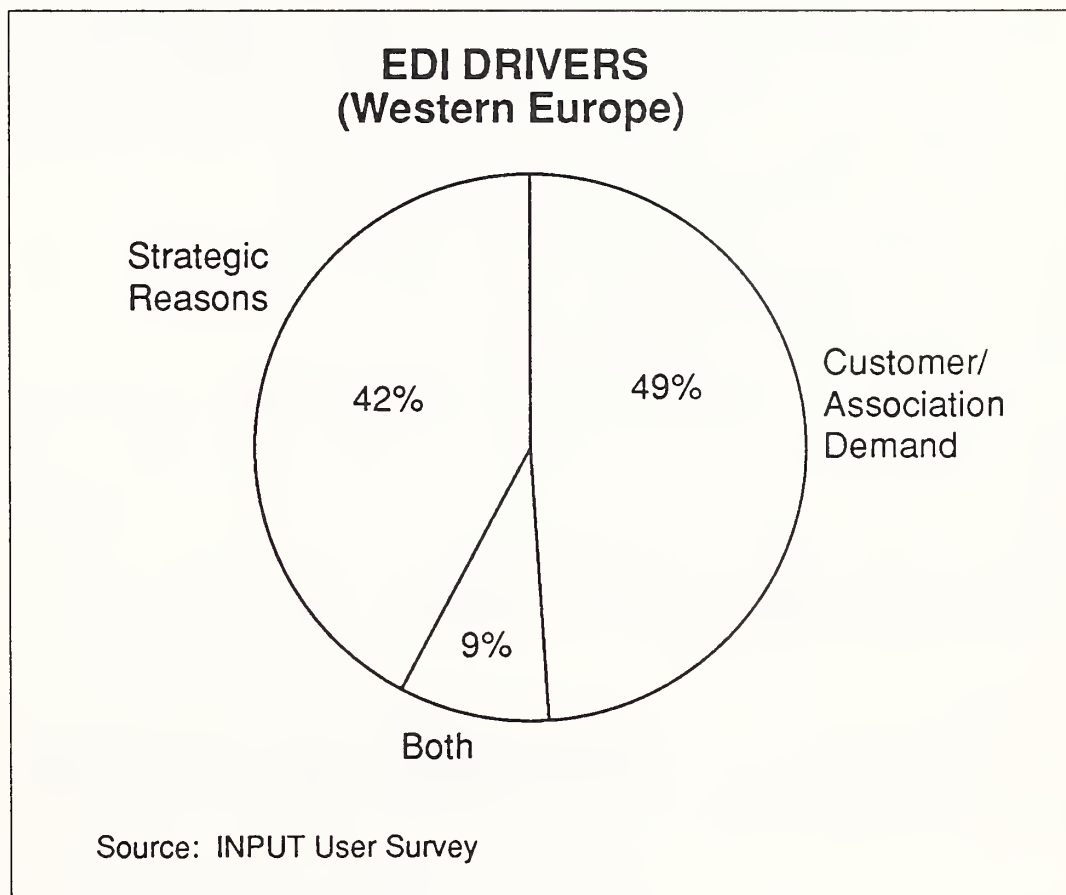
Rating scale 1 to 5: 1=Unimportant and 5=Extremely important

Average standard error =0.1

E**Implementation Issues 1. Reasons for Implementation**

INPUT asked users for their reasons for implementing EDI. As Exhibit VI-13 illustrates, almost half the current EDI users implemented the application in response to their customers or an association, whilst 42% adopted EDI for their own (strategic) reasons with the balance giving a combination of the two as their rationale for starting.

EXHIBIT VI-13

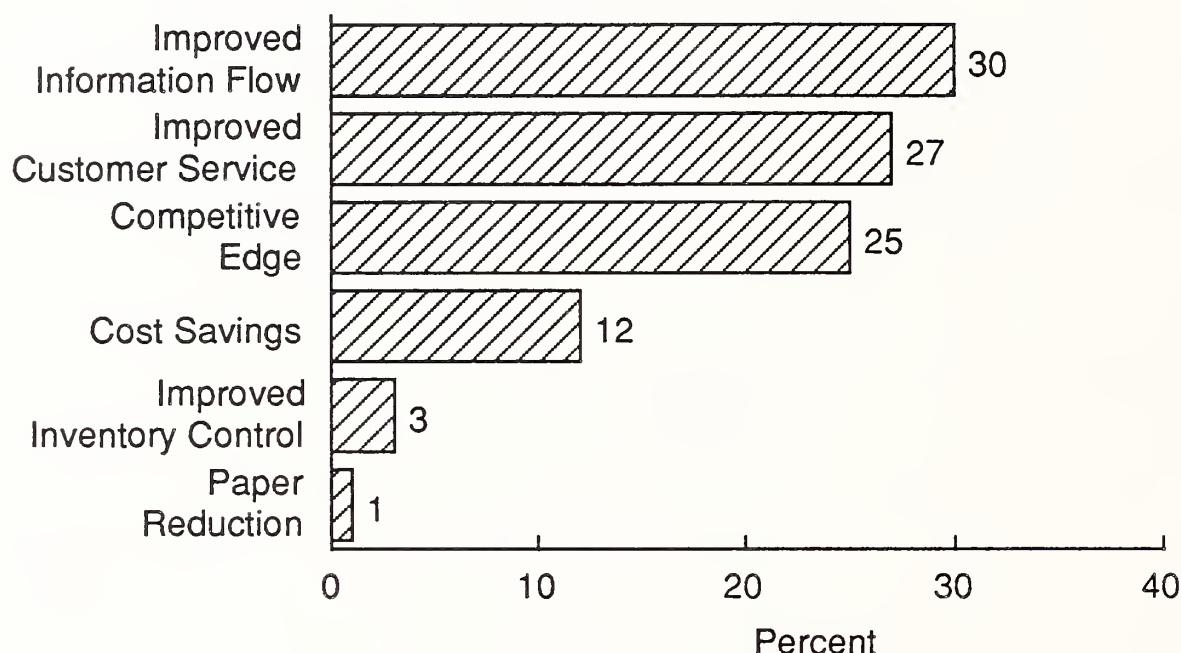


When those who had cited strategic reasons for implementation were asked more specifically for their corporate reasons, almost a third cited improved information flow, followed by improved customer service, competitive edge/advantage and cost savings. These reasons are illustrated in Exhibit VI-14.

These findings indicate an increase in what has been termed “EDI awareness.” Past research, as shown in INPUT’s 1986 report on EDI in Europe, showed that many managers were only vaguely aware of EDI’s benefits, citing it in most instances as a means of reducing cost. Whilst cost benefits can be substantial (i.e., research from our US programme

EXHIBIT VI-14

EDI START-UP REASONS (STRATEGIC) (Western Europe)



Source: INPUT User Survey

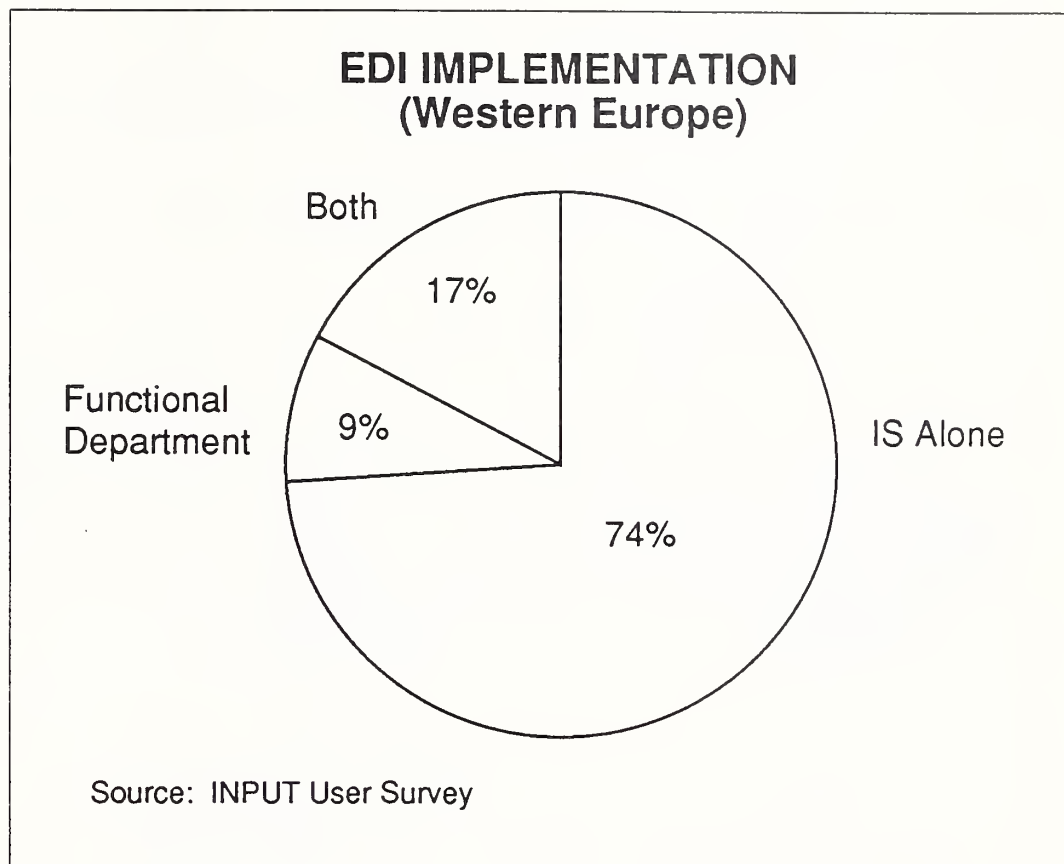
reveals that while the cost of preparing a manual document was \$49, an EDI document was only \$4.70, better than a 10 to 1 ratio), the benefit of improved responsiveness is more significant.

EDI enables orders to be transmitted and processed more quickly and accurately and delivers significant management benefits in the form of improved cash flow, better stock control and improved management information.

2. Implementation Execution

Users interviewed reported that in most instances the IS department was solely or partially responsible for the EDI implementation, which is to be expected since EDI is an application of computing and telecommunications. However, just over a quarter of the respondents reported that IS and a functional department jointly managed EDI implementation, with the partner being either marketing, purchasing or a combination of departments. These results are illustrated in Exhibit VI-15.

EXHIBIT VI-15



INPUT would anticipate that, as the EDI market develops, the trend will be towards joint implementations with many departments sharing development responsibilities.

This conclusion is further supported by the fact that over 80% of users reported receiving implementation assistance from network services' vendors, with a further 12% receiving assistance from industry and trade associations.

F

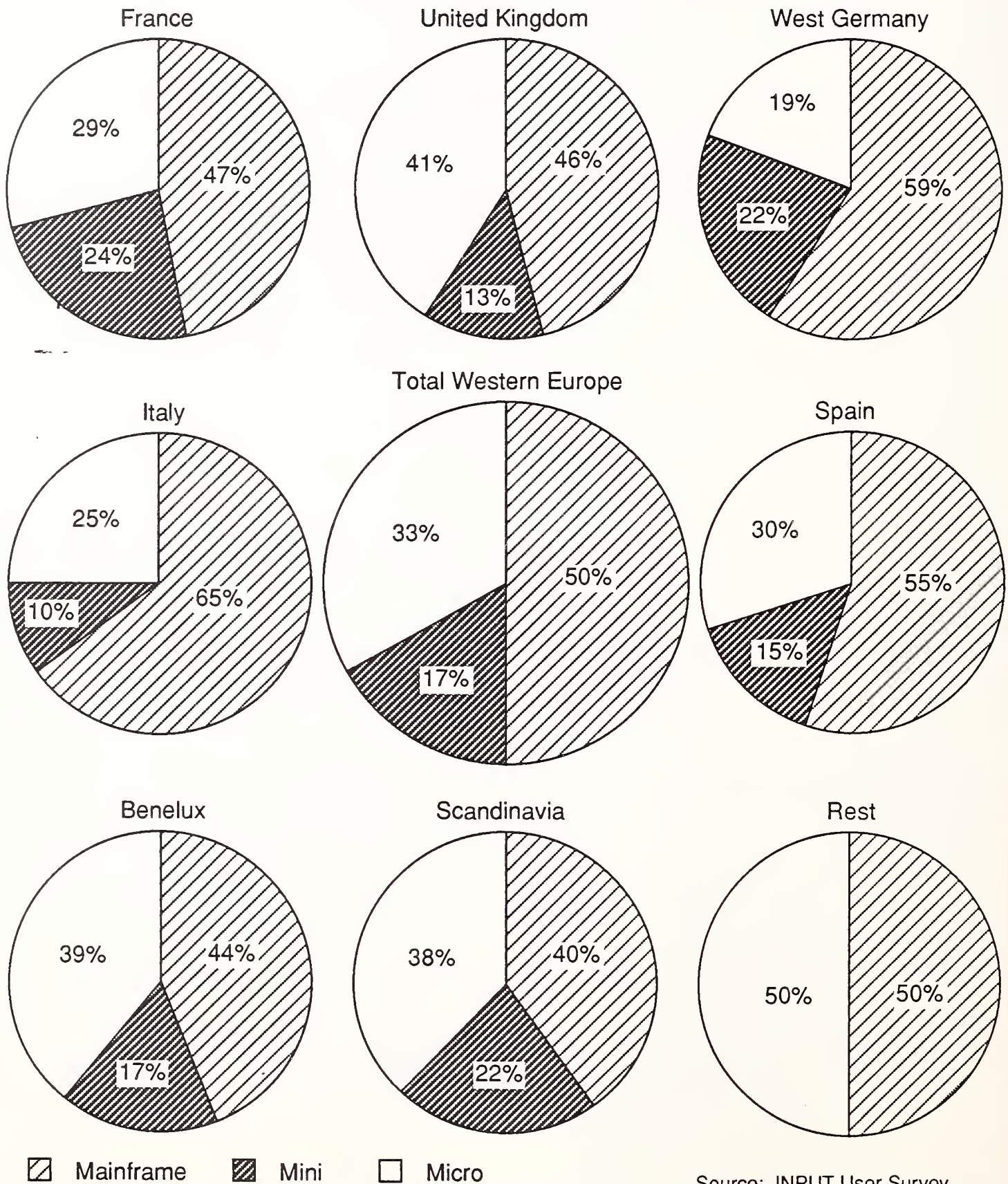
Computer Platform Choices

Exhibit VI-16 graphically illustrates the European situation regarding the type of computer used for EDI. The high percentage rating for microcomputers being used for EDI functionality demonstrates that users are isolating the EDI translator from the mainframe source of data by downloading flat files for external communications.

The high penetration of microcomputers in the more developed EDI markets, such as the U.K. (41%) and Benelux (39%), indicates that users are employing the microcomputer to serve as an intermediary process in order to speed EDI implementation by isolating the mainframe from direct external access for security reasons and by off-loading the larger and more complex systems from the transactional processing requirements of EDI.

EXHIBIT VI-16

COMPUTER USED FOR EDI



Source: INPUT User Survey

As EDI penetration increases, the microcomputer will be used as a front end to the mainframe as well as the basis for standalone systems. This becomes particularly apparent when the hub/spoke approach is considered. Many potential users, smaller companies, do not possess mainframes or minis and will be looking to carry out EDI on a microcomputer. Additionally, PC-EDI can be implemented more quickly and more cost effectively.

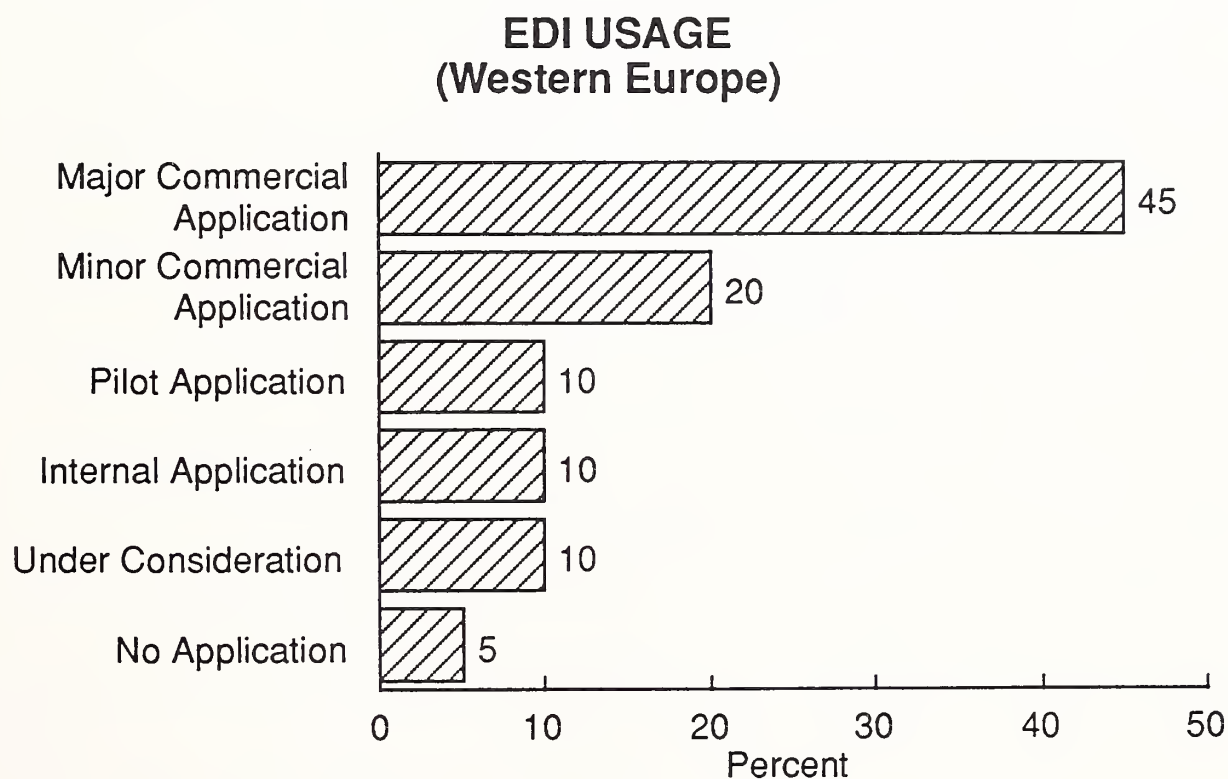
G

EDI Opportunities

1. Applications

Exhibit VI-17 illustrates that a considerable amount of further EDI activity is imminent. Almost one-third of respondents were actively planning, conducting an EDI pilot or using EDI internally. Even if only a percentage of these progress to full implementation, it still represents a significant increase in the level of EDI activity in Western Europe.

EXHIBIT VI-17



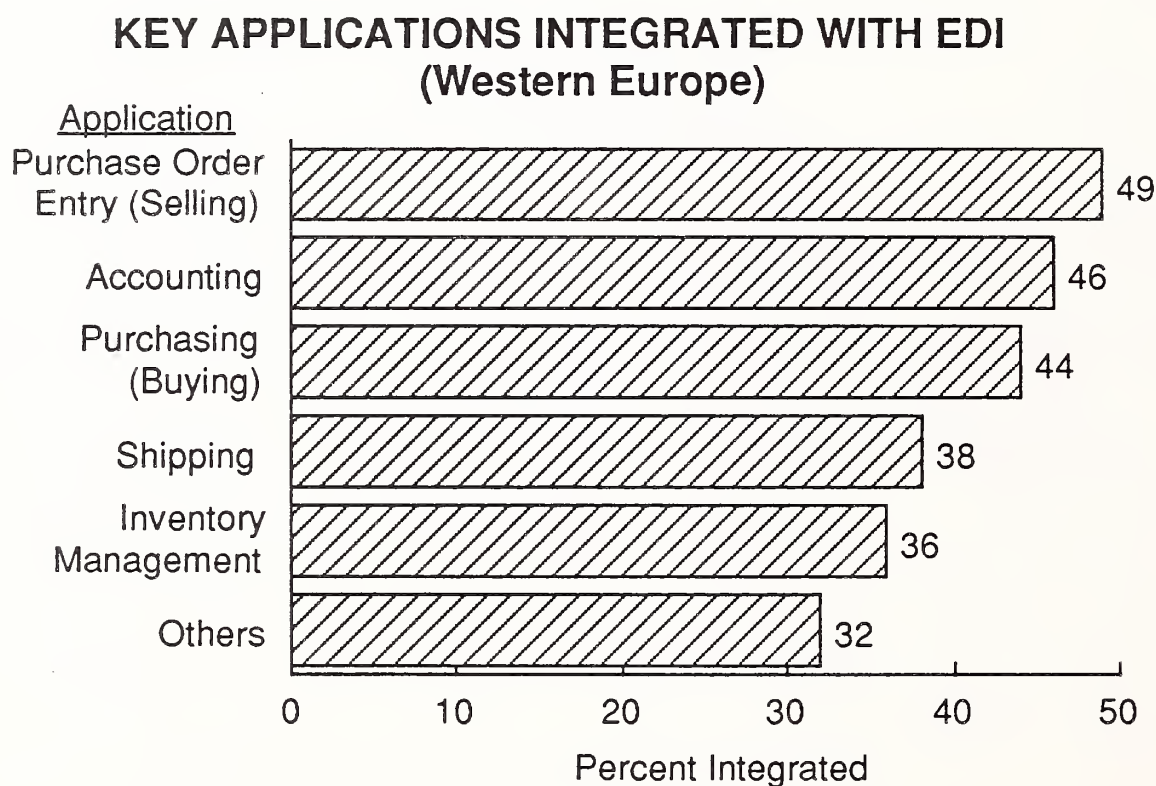
Source: INPUT User Survey

The corollary to these developments is that user organisations need to move quickly if they are to keep up with developments in their sector of activity. Those who delay may well be conceding competitive advantage opportunities to competitors.

2. Transaction Sets

Purchase orders and invoices are the dominant transaction sets used in EDI implementations. Key applications are depicted in Exhibit VI-18. The full benefits of the method will not be recognised until additional transaction sets are used. This should be accelerated by obtaining corporate commitment to use EDI throughout the organisation and will result in enhanced-EDI functionality.

EXHIBIT VI-18



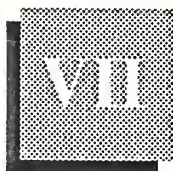
Source: INPUT User Survey

Experience with one EDI type will usually be followed by implementation of other types; if one EDI application is central to the business, then it is likely that there will be others. An example of this would be in the automotive sector where manufacturers are looking to transfer design information as well as purchase orders to their suppliers.



EDI into the 1990s





EDI into the 1990s

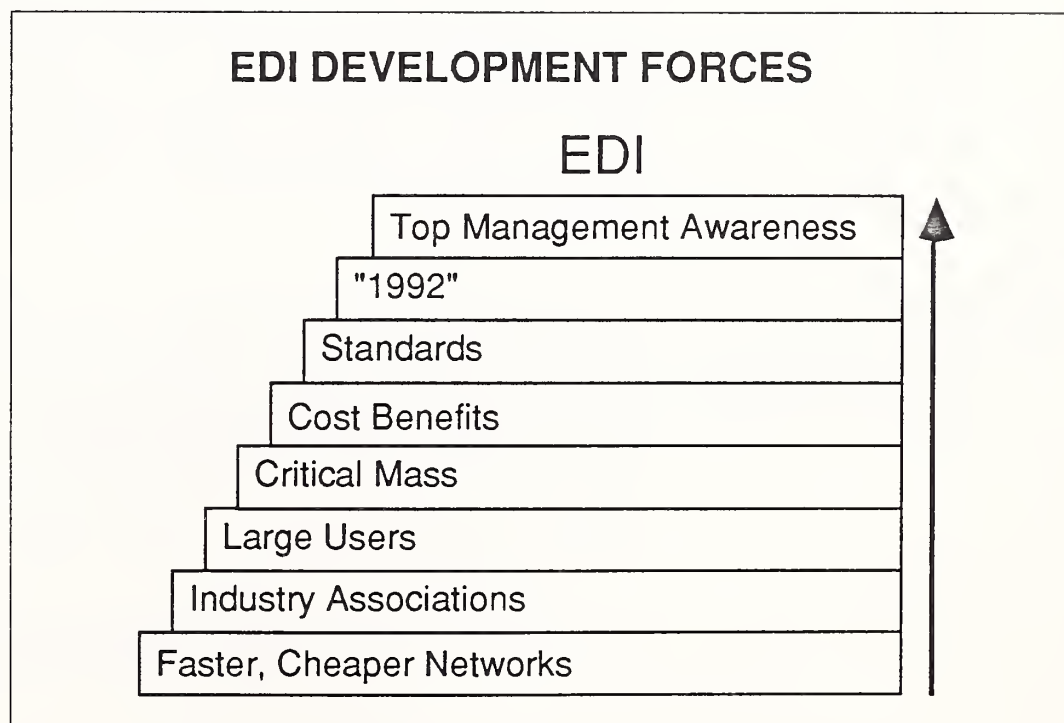
A

EDI Development Forces

Exhibit VII-1 shows the development forces behind EDI's growth. The existence of faster, cheaper networks is a key development force because of three major factors:

- Deregulation of the public telecommunications network
- Blurring and lack of technological distinction between data processing, office automation, telecommunications and control systems technology through the common use of network-oriented microprocessor-based systems
- The growing dependence and commitment to the network and the network "backbone" as a framework for conducting business

EXHIBIT VII-1



For the financial and operating benefits of EDI to be realised, a critical mass of trading partners is crucial. It is only when this stage is reached that the paper-based operations can be reduced. INPUT's user research has indicated that some larger organisations have addressed this requirement (for critical mass) by forcing suppliers to adopt EDI. In some cases, the user organisation has not been prepared for the changes proposed.

INPUT believes that multiple standards will not represent a significant impediment to international EDI. Standards supporting international trade are increasingly available, and the work of the UNECE is proceeding fairly rapidly. Furthermore X.400 will work to overcome incompatible systems and support internetwork communications.

Early adopters of EDI who have reaped the early rewards of cost reduction are now creating new trading structures, which will result in significant cost benefits.

The existence of industry associations—which usually comprise competitors—means that organisations are working together to define the messages required, using whatever is available internationally insofar as syntax and message standards are concerned. This work will be carried out by development groups, mirroring the different sectors of the industry and will continue to stimulate EDI growth.

EDI technology is not a solution in itself. It is vital for top management to advocate and administer organisational change. This change comprises changes in business and working practices, job functions, manning levels, organisational infrastructures and information flows.

INPUT believes strongly that where office automation could be said to have failed to fulfill much of the concomitant hype that surrounded its introduction and in no way impacted on the organisation's infrastructure, EDI—because it imports external influences and more crucially, because it cuts across internal functions and departments—is likely to have much greater success.

B

Vendor Recommendations

Organisations throughout Western Europe are becoming more aware of EDI and are beginning to recognise, through vendor presentations, government initiatives and user implementation experiences, the complexity inherent in the decision to adopt EDI. The complexity often means that it is necessary to enhance or replace existing systems, or install new applications, in order to fully take advantage of EDI's speed and other improvements.

As a result, there are additional opportunities for vendors to increase sales and to develop professional services contracts. It is particularly

vital at this stage for vendors to offer professional services in order to help with the process of integrating EDI with other applications and to overcome the inhibiting factor of an organisation's internal politics, since optimally EDI should be implemented in several functional areas and be incorporated into the overall strategy of an organisation.

As a result, it is vital for vendors to either develop these skills themselves or to form alliances that expand their capabilities offered to the market. The trend should be towards offering a totally integrated EDI solution.

Furthermore, the EDI software companies should be looking to ease the integration of EDI with other applications and plan for integrated products that can be used throughout an organisation. These products may encompass a variety of related applications, such as electronic funds transfer, electronic forms processing and EDI-generated databases, in order to render the value of EDI throughout the organisation and trading group. These recommendations are summarised in Exhibit VII-2.

EXHIBIT VII-2**EDI VENDOR RECOMMENDATIONS**

- Integrate with related applications
- Offer professional services solution
- Overcome internal politics
- Address multiple functional areas
- Integrate with EFT
- Develop EDI databases

C**User
Recommendations**

EDI is vital to any organisation that wishes to remain competitive in a single European market. Companies should be looking to assess the commercial implications of EDI, identifying the window of opportunity for EDI implementation.

For example, EDI can:

- Enable an organisation to cut out intermediaries when dealing with customers and suppliers

- Open up the opportunity to sell existing goods and services in different ways and potentially to wider markets
- Reduce costs and improve efficiency
- Improve information flow
- Offer new services

One of the more difficult steps is the identification of the most suitable approach to the introduction of EDI. It is important to highlight the key applications according to their potential impact on the business. The choice of approach is intimately linked to the organisation's commercial reasons for using EDI. For example, an organization seeking to gain competitive advantage will need to take the initiative in providing an EDI service for its industry.

Other key decisions concern the choice of methodology, whether to subscribe to a network service operated by a third-party provider or to attempt to set up direct links with trading partners. This decision should not merely be a question of cost and service, but also based on the control that the service operator exerts and in the confidence in the security of the service.

Another key decision concerns message standards. Despite the progress being made with EDIFACT, there is a justification for adopting either national (Tradacom in the U.K., for example) standards or industry-specific standards. If the application has a strong commercial justification, there is no point in delaying simply because of lack of standards.

One of the major criticisms expressed by vendors should perhaps serve as the final point. User organisations are not prepared for EDI, or rather, they have not adequately prepared themselves. A considerable amount of internal preparation is required for EDI, involving changes to the existing systems and changes in documentation, for example. For this, an internal EDI manager is important for successful implementation. These recommendations are summarised in Exhibit VII-3.

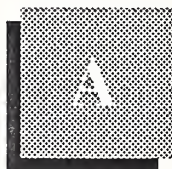
EXHIBIT VII-3

EDI USER RECOMMENDATIONS

- Identify most suitable approach
- Highlight key applications
- Decide on methodology
- Adopt industry-specific standards
- Avoid "perpetual" pilots
- Install "EDI manager"



Appendix: Glossary of EDI Terms

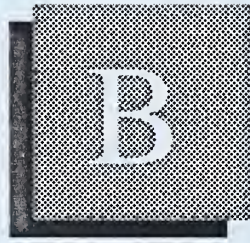


Appendix: Glossary of EDI Terms

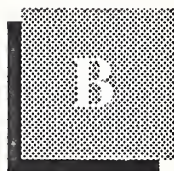
ABI	Automated Broker Interface
ACH	Automated Clearinghouse
ACP 90	Air Cargo Processing in the Nineties
AECMA	Association Européenne des Constructeurs de Matériel Aérospatiale
AGHA	Antwerp Port Community
ANA	Article Numbering Association
ANSI	American National Standards Institute
APACS	Association of Payment and Clearing Services
ASTI	Association des Services Transports Informatiques
ATM	Automatic Teller Machine
BACS	Bankers Automated Clearing Service
BDI	Batch data Interchange
BEDIS	Booktrade Electronic Data Interchange Standards
BTAT	British Telecom Applied Technology
CAD/CAM	Computer Aided Design/Computer Aided Manufacturing
CADDIA	Cooperation in the Automation of Data and Documentation for Imports/ Exports in Agriculture
CASE	Common Application Service Elements
CCITT	Comité Consultatif International Télégraphique et Téléphonique
CEFIC	Conseil Européen des Fédérations de l'Industrie Chimique
CEPT	Committee of European Postal and Telecommunications Administrations
DISH	Data Interchange for Shipping
EAN	International Article Numbering Association
EBDI	Electronic Business Data Interchange
ECU	European Currency Unit
EDI	Electronic Data Interchange
EDIA	Electronic Data Interchange Association
EDICON	Electronic Data Interchange in Construction
EDIFACT	Electronic Data Interchange for Administration, Commerce and Transport

EDIFICE	Electronic Data Interchange Forum for Companies Interested in Computing and Electronics
EDIMS	Electronic Data Interchange Messaging System
EFT	Electronic Funds Transfer
EFTPOS	Electronic Funds Transfer at Point of Sale
EP	Electronic Publishing
EPOS	Electronic Point of Sale
ETDI	Electronic Trade Data Interchange
FTAM	File Transfer Access and Management
IGES	International Graphics Exchange Specification
INTIS	International Transport Information System
JEDI	Joint Electronic Data Interchange
JIT	Just-in-Time
LACES	London Airport Cargo EDP System
LDI	Logistics Data Interchange
MDN	Managed Data Network
MDNS	Managed Data Network Service
MCP	Maritime Cargo Processing
MOTIS	Message Orientated Text Interchange System
NAPLP	North American Presentation Layer Protocol
ODETTE	Organisation for Data Exchange by Teletransmission in Europe
OFTTEL	Office of Telecommunications (UK)
OFTP	Odette File Transfer Protocol
PACE	Ports Automated Cargo Environment
PDN	Public Data Network
PSS	Packet Switch Service
PSTN	Public Switched Telephone Network
PTT	Postal, Telegraph and Telephone Administration
PVS	Private Videotex System
SEAGHA	Systems Electronic and Adapted Data Interchange in the Port of Antwerp
SITA	Society of International Airline Telecommunications
SITPRO	Simplification of International Trade Procedures Board
SMMT	Society of Motor Manufacturers and Traders
SOFI	Système d'Ordinateurs pour le traitement de fret International
SWIFT	Society for World Interbank Financial, Telecommunications

TDCC	Transportation Data Coordinating Committee
TDI	Trade Data Interchange
TEDIS	Travel Industry System Standards Group
TRADACOMS	Trading Data Communications Standard
TS	Transaction Services
TUA	Telecommunications Users Association
UNECE	United Nations Economic Commission for Europe
UNICORN	United Nations Interactive (message) Concept Over Reservation Networks
UNJEDI	United Nations
UNTDDED	United Nations Trade Data Elements Directory
UNTDI	United Nations Trade Data Interchange
VADS	Value Added and Data Services
VANS	Value Added Network Services
VDA	German Automotive Trade Associations
X.400	International electronic messaging standard
X.12	Generic EDI standards approved by the American Standards Committee
X.25	International standard formulated by CCITT for assembling and transmitting data in a packet-switched network



Appendix: EDI Vendor Questionnaires



Appendix: EDI Vendor Questionnaire

EDI Vendor Questionnaire (Services)

Name: _____
Position: _____
Company: _____
Address: _____
Telephone: _____

UK: F: WG: I: BNL: SK: E:

1. EDI Service:
 - a. Development
 - b. Product/service offering
 - c. Documents supported
 - d. Pricing - average transaction cost
 - e. Tariff structure (small/medium/large)
 - f. Standards supported
 - g. Mailbox facility
 - h. Security
 - i. Levels of investment
 - Software
 - Network
 - Personnel

2. Target Markets

Verticals

- Retail
- Automotive
- Financial
- Automotive
- Shipping
- Transport
- Electronics
- Pharmaceutical
- Aerospace
- Travel
- Medical
- Banking
- Insurance
- Public Authorities
- Other

3. Most significant factors that will influence (inhibit the development (or potential development) of EDI services in each target vertical/country market? Please give high/medium/low impact rating.

Factors**Markets**

User Awareness

Pricing

Industry Associations

Standards

PTT Regulations

Technology

Marketing

4. How important are multinational communications to your future plans? Are there any special political, technical, legal or other problems with regards to international EDI?

5. Have you entered into any commercial partnerships in order to develop and market your service? How will this change in the future?

Prompts

Industry Associations:

Telecommunications Companies:

Agents:

Distributors:

Joint ventures with other vendors:

6. Do you have or foresee the need to interface your EDI service with other services?

Prompts

Electronic Mail:

Videotex:

EFT:

EFTPos:

Other networks?

Prompts

Other Commercial Networks:

Public Networks:

Private Networks:

7. i. What are your users/prospective users principal concerns when implementing/evaluating an EDI system?
- a. Cost justification:
 - b. Data security:
 - c. Standards & compatibility:
 - d. International communication:
 - e. Reliance on single vendor:
 - f. Service operating requirements:
 - g. Implementation support:
 - h. Development lead times:
 - i. Other:
- ii. Which of the following human and general organisational factors are of concern to your users?
- a. Senior management support:
 - b. Relationships with competitors:
 - c. Employee relations:
 - d. Attitude to technological change:
 - e. Attitude towards change in traditional buyer/supplier relationships:
 - f. Other:
8. What do you think are the most important factors that will ensure success in the development of an EDI service?

9. What do you consider to be the most significant benefits of EDI systems to your users?

Prompt

Improved customer service
 Cost reduction
 Improved productivity
 Improved cash flow
 Improved inventory control
 Time saving
 Improved business relationships
 Other

10. What level of EDI service revenue growth are you experiencing or planning for over the next five years?

11. How large do you think the market is currently (1989) and will be by 1994?

Current:

In 1994:

12. What revenues are you generating from EDI services and what is the breakdown by market?

Market	Revenue Generated
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

13. Who would you describe as your principal competitors in each market segment? Please rank in order of importance and estimate their market share?

Market	Competitors	Ranking	MarketShare
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

14. What in your opinion will be the likely product cycle for EDI services?

Prompts

Length

Profitability—Payback Period

Pricing Methods

R & D

15. Are there any other issues relating to EDI that have not been discussed?

16. Can you recommend any customers that we might contact for our survey?

EDI Vendor Questionnaire (Software)

INPUT is updating its directory of EDI software providers and doing an analysis of the market. We want to make sure that we have correct information on your EDI software products. Is now a good time?

Main Business Focus: _____

Year Founded: _____

Number of Employees: _____

EDI Products Description:

Date Introduced: _____

Current Version: _____

Features: _____

Computer Equipment Required/Operating System: _____

Memory Requirement: _____

Require Emulation Board? (Y/N - Type) _____

Standard Supported: _____

Is EDI translation integrated with communications functions?

☐ Yes ☐ No If (No) what comms software is required?

Is EDI translation integrated with communications functions?

☐ Yes ☐ No Which applications?

Do you offer professional services to integrate your software with a customer's applications?

☐ Yes ☐ No

What is your typical charge for this integration on an hourly/daily basis?

Could you describe a typical integration project?

Pricing:

What is the average selling price of your product?

Are volume discounts available?

Sales, Marketing and Distribution:

Do you sell directly/indirectly to customers?

If indirect, who sells your software?

What are your targeted markets?

Who do you consider your principal competitors?

Product Differentiation:

How do you differentiate your EDI products and your company?

Base/Sales:

How many packages do you have in your INSTALLED BASE in Europe?

UK ____ F ____ WG ____ I ____ BNL ____ SK ____ E ____ Other ____

Approximately how many of these do you estimate were sold by your distributors or partners? _____

How many packages were sold in 1988? _____

What were your revenues for EDI products? _____ for professional services? _____

What are you projecting for 1989 sales volume for EDI software? _____ for professional services? _____

What trends/directions do you see occurring in the EDI market generally and specifically with regard to packaged EDI software?

Do you see the need for integrated solutions rather than standalone products?

Do you see more mergers/alliances happening?

EDI Services Questionnaire (Professional Services)

Name/Company/Address/etc.

"Hello..."

1. How do you define/segment your professional services' activity—any changes anticipated?

2. Percent of business in professional services? _____

3. Rate of growth? _____

4. Percent of professional services in network services/EDI?

Areas:

- Consultancy _____
- Systems _____
- Applications _____
- Software _____
- Other _____

5. Factors for customer selection:

- ☐ Shortage of personnel
- ☐ Technical skills
- ☐ Time
- ☐ Cost
- ☐ Competitive advantages
- ☐ Increasing systems complexity
- ☐ Need to implement EDI
- ☐ Rapid changes
- ☐ Standards
- ☐ Companywide (remote location) development
- ☐ Other (specify)

Comments: _____

6. What initiatives have you undertaken to develop your EDI services?

- ☐ Joint venture
- ☐ Marketing agreement
- ☐ Acquisition/merger
- ☐ Corporate/product image
- ☐ Advertising
- ☐ Company reorganisation
- ☐ Specialist staff recruitment
- ☐ Specialist staff training
- ☐ Other

7. What are the specific aims?

- ☐ Enter new markets (verticals)
- ☐ Enter new countries
- ☐ Achieve critical market position

8. What are the key skills critical to your organisation's future success?

- ☐ Project management
- ☐ Telecommunications
- ☐ Software development
- ☐ Specialist industry knowledge
- ☐ Other

9. What specific steps are being taken by your organisation to develop skills?

- ☐ Training
- ☐ Contacts with industry/trade associations
- ☐ Government
- ☐ Arrangements with other organisations

10. What changes do you see in the industry structures?

- ☐ New entrants
- ☐ RBOCs
- ☐ Big 8
- ☐ Management consultants
- ☐ PTTs
- ☐ Software product companies
- ☐ Other

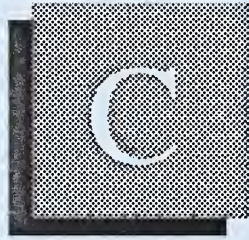
11. Most critical factors for success?

12. How do you rate the different rates of development/deregulation in the various European countries?

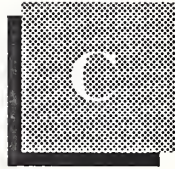
13. Key proprietary technologies/methodologies that give you a strategic lead over others in the industry?

14. Main problems?

15. Any customers worth contacting?



Appendix: EDI User Questionnaire



Appendix: EDI User Questionnaire

Hello, my name is (INPUT) and the purpose of this call is to get your help in improving EDI services and software. If you have a few minutes, I'd like to ask you some questions. The results of our survey will be read by companies offering EDI products. We won't be identifying you or your company, only the aggregate results. In exchange for your help, I'll send you a summary of our survey.

Name: _____
Position: _____
Company: _____
Address: _____

Telephone: _____
No. Employees: _____
Activities: _____

1. Can you tell me when you started using EDI?

- a. This year (1989) ☐
- b. Last year (1988) ☐
- c. 1987 ☐
- d. 1986 or earlier ☐

2. Did you have any outside help when you implemented EDI?

- Yes ☐
- No ☐

3. If (Yes), did this help come from

- Network service company ☐ (who) _____
Software company ☐ (who) _____
Professional services company ☐ (who) _____
Industry association ☐ (who) _____
Bank/financial services company ☐ (who) _____

4. Why did you start using EDI? Specifically, was it in response to a major customer(s), or did you do it for your own reasons?

- Customers ☐
Own reasons ☐

What were those reasons?

5. What size computer are you primarily using for EDI translation and communications?

- Is it a (a) micro ☐
(b) mini ☐
(c) mainframe ☐
(d) other ☐

Are any of the computers you use for EDI connected to other computers within your company?

- Yes ☐
No ☐

6. a. Are you doing EDI *directly with your trading partners*?

- Yes ☐
No ☐

Do you use a *third party network*?

- Yes ☐
No ☐

Do you use a combination of *direct and third party*?

Yes ☐

No ☐

- b. If using a *third party network/combination*. Which third party network are you primarily using for EDI, and can you estimate how much traffic goes through it?

Enter % Here _____

- c. Which network are you *secondarily* using for EDI and can you estimate the percent of traffic that goes through your second network?

Enter % Here _____

What amount of EDI traffic goes from you *directly* to your trading partners?

Enter % Here _____

7. On a scale of 1-5 (5 = highly rated) how would you rate each third party network in terms of:

Overall technical quality	1	2	3	4	5
Customer support	1	2	3	4	5
Price	1	2	3	4	5

Do you have any specific complaints about the network you are now using?

On a scale of 1-5, how important is it for your network vendor to connect with another network? In other words, how important is it for you to send EDI documents to someone who subscribes to another network?

1 2 3 4 5

Why that rating?

8. Is your EDI network interconnected with other networks?

- Yes ☐
No ☐

Do you have any comments about this?

9. Did you

- a. Write ☐
b. Purchase ☐*
c. Buy and customise the ☐
EDI software ☐

10. * b -Which vendor?

Why did you choose this company?

11. Could we rate the importance of software features?

Be easily integrated with other business applications such as accounting/inventory, etc.	1	2	3	4	5
Support graphics	1	3	3	4	5
Be easily used by non-computer users	1	2	3	4	5
Acknowledge successful transmission	1	2	3	4	5
Report exceptions clearly	1	2	3	4	5
Have a maintenance agreement for updates/fixes	1	2	3	4	5

12. With regard to integrating EDI software with other applications such as accounting/purchasing, which is more preferable?

- ☐ To integrate the EDI software with your other applications yourself
- ☐ To have the software company do the integration
- ☐ Hire a professional services firm to integrate the software with your other applications
- ☐ To buy new software for accounting, inventory, etc. with built-in EDI functionality

13. What applications have been integrated directly with your EDI functions?

- ☐ Purchasing (buying)
- ☐ Purchase order entry (selling) shipping
- ☐ Accounting (accounts receivable? accounts payable?)
- ☐ Inventory management
- ☐ Others

14. What do you think is needed to make EDI software work more closely with your other applications?

15. What transactions are you now doing through EDI and which do you plan to do via-EDI and by the end of next year (1990?)

	now	1990
Purchase orders FROM customer	<input type="checkbox"/>	<input type="checkbox"/>
Purchase orders TO suppliers	<input type="checkbox"/>	<input type="checkbox"/>
Invoices FROM suppliers	<input type="checkbox"/>	<input type="checkbox"/>
Invoices TO customers	<input type="checkbox"/>	<input type="checkbox"/>
Bills of Lading	<input type="checkbox"/>	<input type="checkbox"/>
Payments TO suppliers	<input type="checkbox"/>	<input type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>

16. Could you estimate your *growth* in the *number* of EDI transactions between the end of 1987 and the end of last year (1988)? _____ %
17. For this year. What % of growth in transactions do you expect between the end of 1988 and 1989? _____ %
18. Have you done any cost analysis, on a per-transaction basis of your *paper-based* systems for purchase order processing, invoicing or other routine paperwork of this nature? (If yes, what did you find out?)
- _____
- _____
- _____
19. Have you done any cost analysis, on a per-transaction basis, of any *EDI* transactions? (If yes, what did you find out?)
- _____
- _____
- _____
20. With approximately how many other companies do you exchange EDI transactions?
- ☐ 1-5
- ☐ 6-10
- ☐ 11-20
- ☐ 21-30
- ☐ 31-40
- ☐ 41-50
- ☐ 50+
21. Do you have any estimate of how many additional companies you will be adding to your EDI this coming year?
- ☐ 1-5
- ☐ 6-10
- ☐ 11-20
- ☐ 21-30
- ☐ 31-40
- ☐ 41-50
- ☐ 50+

Issues

22. Here is a list of issues and problems. Could you give your response (1 = not serious, 5 = serious concern)

a. Cost of using EDI	1	2	3	4	5
b. Network/data security	1	2	3	4	5
c. Software maintenance	1	2	3	4	5
d. Legal issues	1	2	3	4	5
e. Requirements of auditing staff	1	2	3	4	5
f. Changing business practices	1	2	3	4	5
g. Reliance on one vendor or service	1	2	3	4	5
h. Vendor viability	1	2	3	4	5
i. The state of EDI standards	1	2	3	4	5
j. Compatibility of EDI data with other applications	1	2	3	4	5
k. Other concerns _____	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5

23. How did you deal with the "people" issues when you implemented EDI?

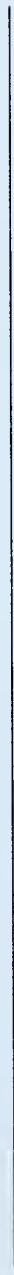
Did the company write new job descriptions for people affected by EDI? Did you fire anyone or use attrition to reduce headcounts?

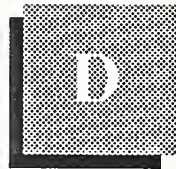
How about the sales departments? How did they react to the idea of using EDI to take orders?

What, if anything, would you have done differently if you were to implement EDI all over again?



Appendix: Analysis of Interviews



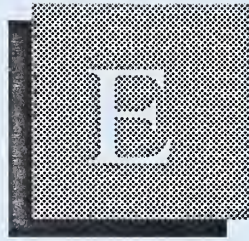


Appendix: Analysis of Interviews

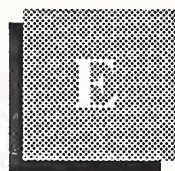
EXHIBIT D-1

ANALYSIS OF INTERVIEWS

Country	Vendors	Users	Others
U.K.	14	40	5
France	6	15	3
West Germany	3	15	1
Italy	2	5	2
Benelux	2	10	2
Scandinavia	2	10	1
Spain	1	5	1
Total	30	100	15



Appendix: Detailed Forecast Data

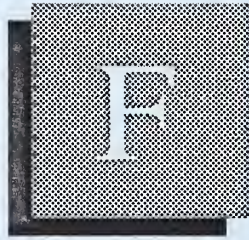


Appendix: Detailed Forecast Data

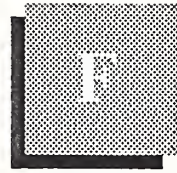
EXHIBIT E-1

WESTERN EUROPEAN EDI SOFTWARE AND SERVICES COUNTRY MARKETS, 1989-1994

	Currency	User Expenditures (Local Currency)						CAGR (Percent)
		1989	1990	1991	1992	1993	1994	
France	FF M	29	65	115	180	250	350	64
U.K.	£ M	9	15	22	30	37	45	36
West Germany	DM M	6	15	30	47	68	93	71
Italy	Lira B	2	6	8	12	27	28	66
Benelux	BF M	87	200	360	595	915	1230	70
Scandinavia	SK M	14	32	52	90	135	180	66
Spain	Pst M	41	120	235	355	590	700	74
The Rest	\$ M	>1	2	4	5	5	6	77



Appendix: Forecast Reconciliation



Appendix: Reconciliation of 1988 and 1989 Forecasts

Each year, INPUT examines the forecasts it provided in previous years in the light of the new data obtained from:

- Current year research
- Actual performance of vendors compared to forecasts
- Reassessment of market drivers and inhibitors and long-term industry trends

The following exhibit shows the comparison of the forecasts made for the EDI market in Western Europe in this report with those included in INPUT's *1988 Network Services* report.

EXHIBIT F-1

FORECAST RECONCILIATION

1988 Market			1993 Market				
1988 Report (\$M)	1989 Report Sizing (\$M)	Variance as Percent of 1988 Report Forecast	1988 Report Forecast (\$M)	1989 Report Forecast (\$M)	Variance as Percent of 1988 Report Forecast	1988- 1993 CAGR Percent in 1988 Report	1989- 1994 CAGR Percent in 1989 Report
40.0	30.0	(25)	250	210	(16)	44	55

